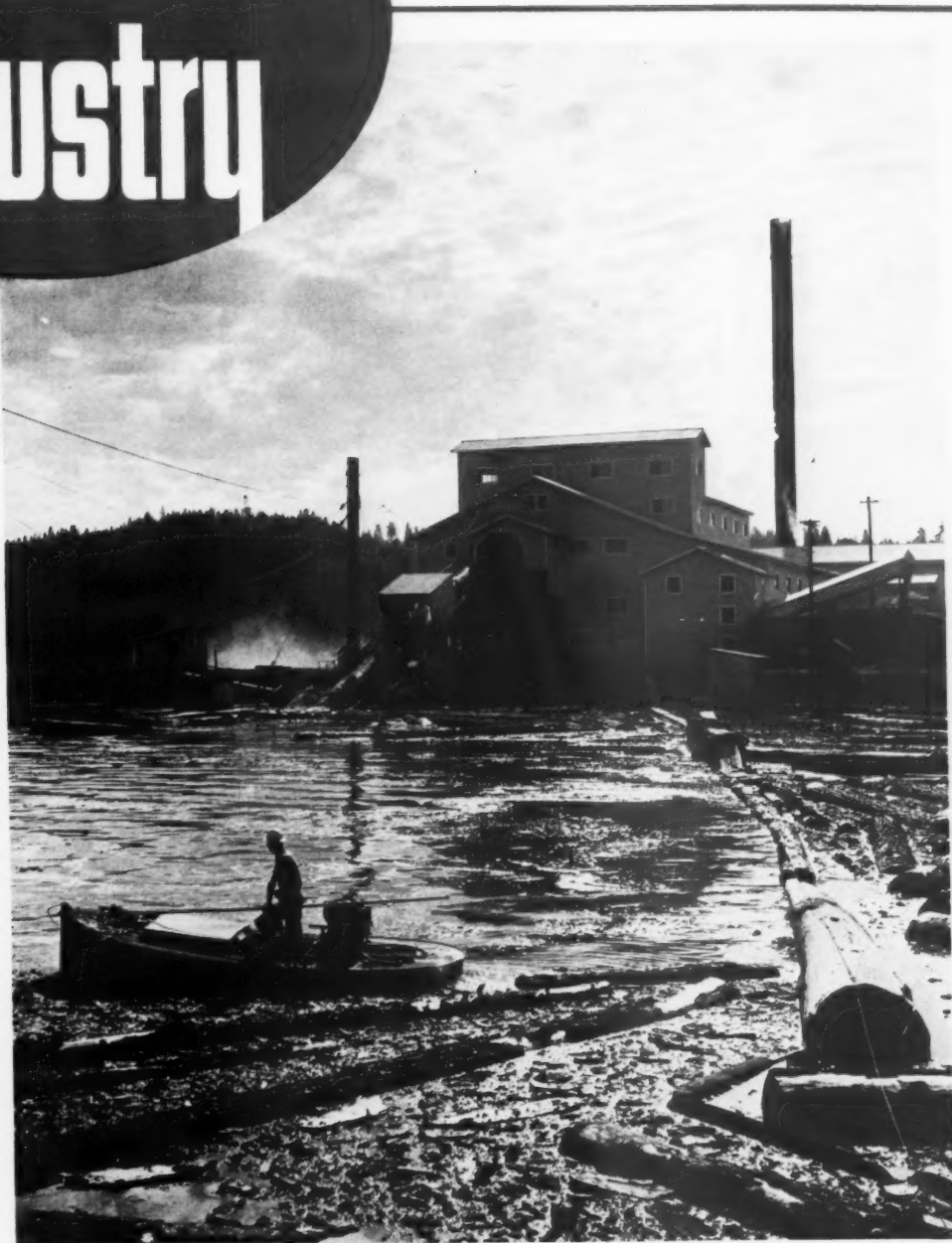


Western Industry

December 1954



From Western mills pour out plywood, timber, pulp and paper, hardboard, and a growing list of valuable forest products.

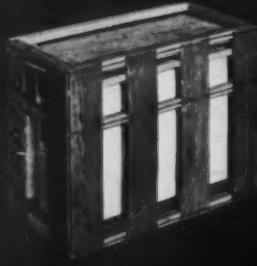



... see page 26

Pump problems probed
Job evaluation benefits





Aluminum ceramic coatings
Germanium rectifier uses

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Ever realize how many kinds of

 <p>PLUMBING FIXTURES—tanks, bowls, lavatories, tubs and shower bases ship in wirebounds. Simpler stacking, palletizing; best protection for porcelain units.</p>	 <p>WATER HEATERS by Wesix weighing 275 lbs. ship in special "double-mat" wirebound. Container saves 45 minutes packing time, weighs less, saves warehouse space, too.</p>	 <p>POLE LINE HARDWARE by Kortick Mfg. Co. also ships in sturdy Cabco wirebounds. 4 lb. crate safely carries 75 lbs. of heavy bolts. No nails to work loose, no damage from load shifting.</p>	 <p>STEAM CLEANERS from Malsbary Mfg. Co. weigh 540 lbs., yet ship safely, surely, in light, tough wirebound. Cabco crate cuts packing time from 45 to 8 minutes.</p>
-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

products ship more economically

 <p>JET ENGINE parts from Ryan Aeronautical Co. must be carefully guarded against travel damage. Cabco wirebound gives real protection, reduces weight, saves crating time.</p>	 <p>FURNACES from a large manufacturer reach dealers in Cabco wirebounds that cut container weight and cost 50%, speed assembly and packing, need less warehouse space.</p>	 <p>BULLDOZER BLADE TIPS from Wooldridge Manufacturing Company go in standard Cabco wirebound, save 16 minutes on packing, save weight, too.</p>	 <p>FIREBRICK from Kaiser Aluminum & Chemical Co.—400 lbs. of it—ships in 20-lb. Cabco wirebound that assembles faster, palletizes easily, saves space.</p>
--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

in Cabco wirebound containers?

Add up the real cost of your present shipping container. How much to buy the container or its parts? How much to assemble; to pack? How much extra shipping cost for container weight that contributes nothing to strength?

Then, let a Cabco engineer show you the practical economics of Cabco wirebounds. These light, tough containers are engineered to your product. They fit perfectly, pack swiftly, save up to 50% on packing and shipping costs.

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Want to cut shipping costs up to 50%?

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**If you work with metals...
DON'T MISS THIS FILM!**

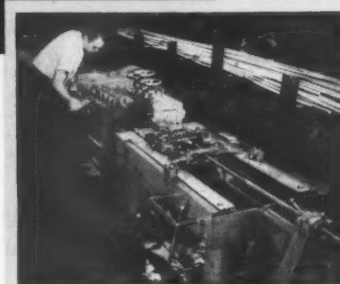
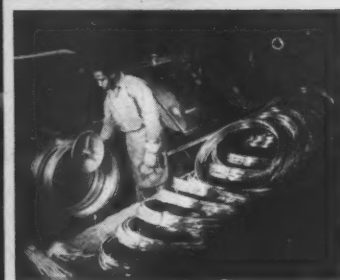
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That's a typical reaction to this dramatic Chase film! "The Science of Making Brass" takes you on a guided tour of Chase mills—shows you exciting, full-color close-ups of every step in the making of brass and other cop-

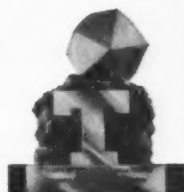
per alloys in the form of sheet, rod, wire and tube. If you work with metals, it's an experience you won't want to miss!

"The Science of Making Brass" is a 16 mm, full-color film with a running time of 29 minutes, and will be loaned to you on request. To arrange a showing, clip and mail the coupon below.



It won these PRIZES First Prize, International Competition for Technico-Industrial Documentary Films, Turin, Italy and Venetia Diploma at Venice Festival.

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DECEMBER 1954

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UNOBA throughout the mill and in our logging equipment with equal success."

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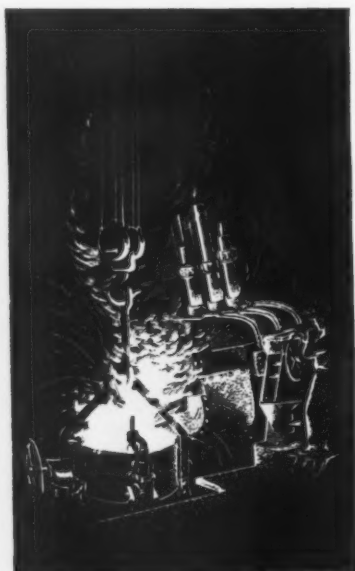


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K-B processes castings of plain carbon steels; nickel-molybdenum steels comparable to S.A.E. 4615; chrome-molybdenum steels of S.A.E. 4140 analysis and special alloys. Each casting produced contains the physical properties specified for the usage—insured by a careful analysis of every melt poured.

Kay-Brunner is equipped with modern facilities to supply steel castings in every size, from a few ounces to over a ton!



KAY-BRUNNER STEEL PRODUCTS INC.

999 MERIDIAN AVENUE, ALHAMBRA, CALIFORNIA

New Design Motor Gives 30% More Power to

SKIL DISC SANDER

**Speed Increased to 5,000 r. p. m.
for Greater Performance
On the Job!**

Powerful...fast...light...and safe! That's the new, improved SKIL Model 852 Heavy Duty Sander. With 30% more power for increased r.p.m. to 5,000, this perfectly-balanced sander assures you *highest maintained working speed* on all jobs.

New front handle location makes more efficient use of tool weight. Shorter length and lighter weight lessen operator fatigue throughout day-long use. The new SKIL Model 852 is practical, dependable...giving peak performance at maximum safety.

No matter what your product, nor what phase of its production is involved...if the problem concerns grinding, polishing, sanding, or finishing—"SKIL is the Answer"!



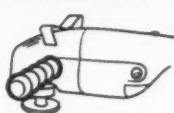
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Radically changed to give 30% more power! Maintains high load speed...yet runs cooler!



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Extra-long rubber protector keeps heavy duty cord away from work area for greater safety.



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Scientifically contoured to fit the hand. More comfortable to use and carry to the job.



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Conveniently located at front of tool housing. Makes accessory changes far easier.



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A completely new SKIL Disc Sander. Produces smoother, faster results with greater ease, at less cost than ever before possible. Far more power; scientific design for lighter, easier handling; dust-tight trigger switch. Ball bearings throughout.

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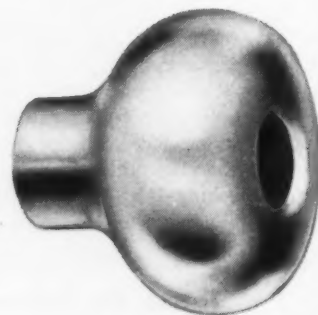
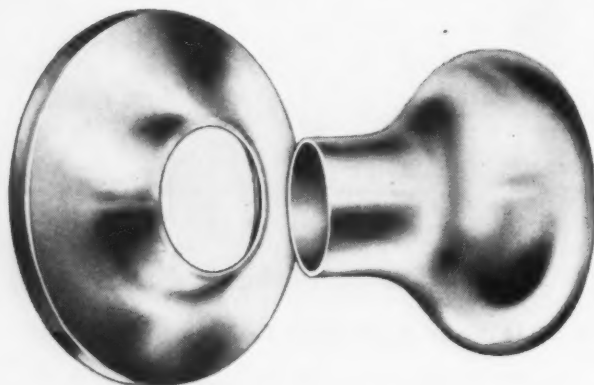
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☐ Please send me literature on SKIL Sanders and Grinders.

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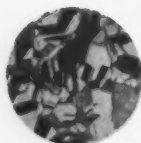
DRAWING BRASS



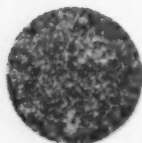
THESE HARDWARE ITEMS are made by Adams Rite Mfg. Co., Glendale, Cal., and National Lock Co. and American Cabinet Hardware Co., both of Rockford, Ill. They are typical of the stamped, drawn and pressed products

Formbrite—Anaconda's new drawing brass—polishes up to

Superfine grain makes Formbrite harder, stronger, springier and more scratch-resistant



75X magnification of ordinary drawing brass.



75X magnification of superfine-grain Formbrite.

Here is what enthusiastic manufacturers of stamped and drawn brass products say about *Formbrite*:

"... cuts our polishing costs up to 50% ... eliminates some finishing operations entirely ... gives amaz-

ingly sharp die impressions...resists scratching in handling ... plates beautifully ... gives a more lustrous finish ..."

Yet *Formbrite** costs no more than the ordinary drawing brasses these manufacturers had been using. In fact, *Formbrite* very often saves more than the metal itself costs.

Why *Formbrite* is easier to use

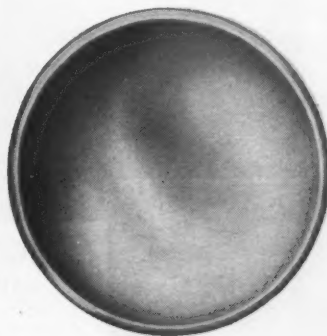
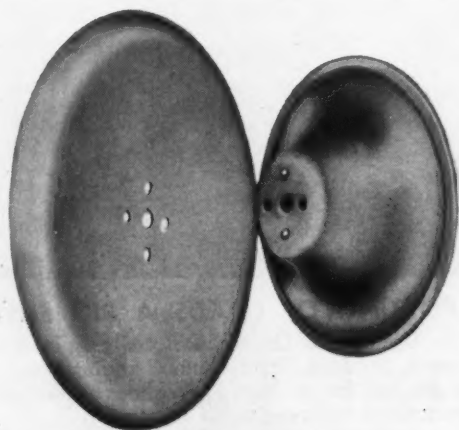
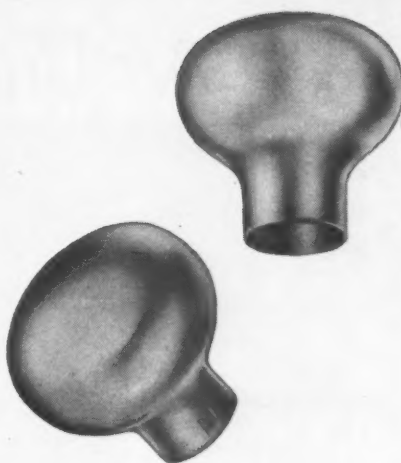
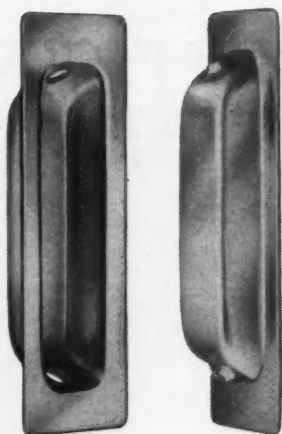
Note *Formbrite*'s superfine grain structure. Compare it with that of

ordinary drawing brass. Special methods of rolling and annealing produce a grain structure so fine that often a simple color buff will bring it to a bright, lustrous finish.

Formbrite is also harder, stiffer, springier and more scratch-resistant ... yet it is surprisingly ductile, readily stamped, formed, drawn and embossed.

Typical case

The Adams Rite Mfg. Co. makes the flush pull shown in the upper right



successfully made of Formbrite. Others include: lipstick holders, fishing lures, automobile hubcaps, gage cases, trophy nameplates, pen caps, etc. (Doorknob parts in lower left illustration have been chromium plated.)

50% faster... costs no more than ordinary drawing brass

illustration above. For this and many other building hardware items, they use Formbrite. They report:

"Formbrite increases surface hardness and rigidity of the part... eliminates several polishing operations and reduces over-all costs. Our flush pull definitely has been improved in quality."

Free sample

Formbrite is available in sheet, strip and coils—in all commercial widths and gages. Millions of pounds of this superior drawing brass have been

made, sold and satisfactorily fabricated.

Want more proof? Mail the coupon and we'll send you a sample of Formbrite. Try it in your polishing room. See for yourself how quickly and easily Formbrite polishes.

*Reg. U. S. Pat. Off.

Formbrite

FINE-GRAIN DRAWING BRASS

AN ANACONDA® PRODUCT

MADE BY THE AMERICAN BRASS COMPANY

FREE SAMPLE—Test Formbrite Yourself

The American Brass Company, Waterbury 20, Connecticut

Los Angeles, San Francisco, Seattle

- ☐ Send me a free sample of Formbrite to try in my polishing room.
☐ Send me Publication B-39, giving forming and finishing suggestions.

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TRAMRAIL CRANES serve United Air Lines San Francisco Base

Spotting an 18 cylinder engine for assembly to a Mainliner 300 is easy because of the fine control with which the Tramrail crane is equipped.



Assembling an outer wing section to an inner wing is a delicate job that is greatly simplified by the push-button-controlled Tramrail crane.

ACCURATE SPOTTING OF LOADS A BIG FEATURE

All planes of the United Air Lines are flown regularly to the company's mammoth, modern "Push-button" maintenance base at San Francisco Airport for servicing. While various intermediate servicing operations are conducted at other hangars along the flight routes, this is the main maintenance base where planes are given complete overhauls.

The planes are dismantled in three large duplicate shops located at one side of the building. These shops, which easily accommodate United's huge Mainliner 300's, are each served by a 3-ton fully motorized Cleveland Tramrail crane.

Bridge and carrier travels of the cranes are provided with automatic accelerating control. With this control various speeds are obtained automatically by depressing the pendant push-buttons. Hoists are provided with variable-speed push-button control. This control makes it possible to spot loads accurately, which is of extreme importance. For instance, when engines are installed, there is a myriad of pipes and fittings that must be matched precisely without damage.



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SHOWING FOR THE FIRST TIME - - -

A New Addition to the Dempster-Dumpster System of Low Cost Bulk Materials Handling

● Now you can have either of two types of Dempster-Dumpsters in the fastest, most efficient and lowest cost method of bulk materials handling ever devised.

IN THIS MODERN, low cost system, one truck-mounted Dempster-Dumpster picks up, hauls and empties, or sets down intact, one loaded detachable Dempster-Dumpster Container after another, regardless of design or size, handling bulk materials of practically every description.



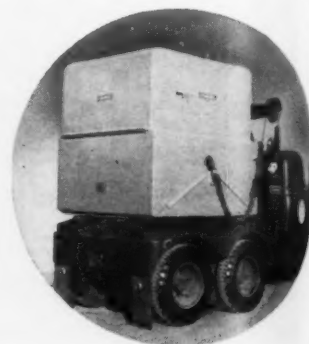
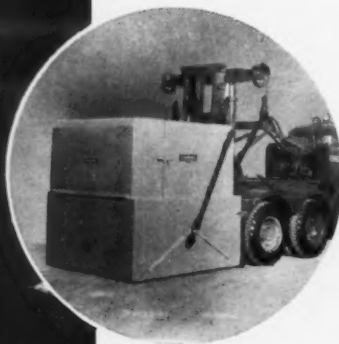
The new Dempster-Dumpster Type DTLF offers several desirable features along with all the economies provided by the Type LFW. These features include: (1) Improved load distribution with container carried in more forward position between wheel centers. (2) Extreme high dumping in cases where it is desired. (3) Vertical pick up of loaded container. (4) Container, loaded or empty, is always in horizontal plane in carrying position. Automatic locking device for positive rigidity of container while in carrying position is, of course, provided.

TREMENDOUS SAVINGS WITH THE DEMPSTER-DUMPSTER SYSTEM HAVE BEEN PROVED BEYOND QUESTION.

One truck-mounted Dempster-Dumpster, operated by only one man, the driver, serves scores of containers of various capacities up to three times greater than the average dump truck. You eliminate trucks standing idle . . . eliminate re-handling of materials . . . eliminate loading crews. You increase efficiency, sanitation and good plant-keeping.

Containers range from 2 to 21 cu. yds. capacity for use with recommended type Dempster-Dumpsters. Each container is designed to suit the materials to be handled—be they trash, rubbish, liquids, dust, bulky, light or heavy. Many leading plants, in almost every type of industry, have found it indispensable after installation. Its proved savings alone justifies an investigation of its potential value in your plant now. Write to us today for complete information. Manufactured and sold exclusively by Dempster Brothers, Inc.

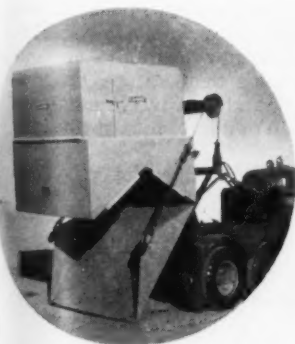
The photo at left illustrates the amazing ability of the Type DTLF Dempster-Dumpster for high dumping. The three photos below show the Pick Up, Haul and Dumping action, hydraulically controlled from cab.



● D E M P S T E R B R O T H E R S I N C .



Photo above shows the new Dempster-Dumpster Type DTLF dumping 8 cu. yds. of rubbish. At right you see the Type LFW with load in carrying position. Dempster-Dumpsters are available in capacities capable of handling up to 38,000 pound payloads.



One Truck-Mounted
Dempster-Dumpster Handles Scores
of Containers... All Designs... All Sizes

ERBROTHERS 5124 N. Knox, Knoxville 17, Tennessee

SOME FACTS YOU SHOULD KNOW ABOUT ROOFING AND SIDING



Much has been written and said in recent years in comparing various types of roofing and siding. We hope that these facts will help you in obtaining a true analysis of the situation.

COSTS

—Prices Per Square Foot In Place*

ALUMINUM (.019", 26 gauge, 2½ x ½ or 1¼ x ¼ corrugations on 2" x 4", 18" centers)	\$.266 per sq. ft.
ALUMINUM (.019", 26 gauge, same corrugations on 1" x 6", 12" centers with building paper)	\$.305 per sq. ft.
ASBESTOS SHINGLES	\$.423 per sq. ft.
ASPHALT SHINGLES (210#)	\$.337 per sq. ft.
NO. 1 RED CEDAR SHINGLES (clear)	\$.336 per sq. ft.
USS GALVANIZED CORRUGATED STEEL (.019", 28 gauge, 2½ x ½ or 1¼ x ¼ corrugations on 2" x 4", 24" centers)	\$.180 per sq. ft.

*Based on published figures or cost records of building contractors. Includes labor costs which may vary with area.

Care and treatment

Contrary to popular belief, all metal roofing requires treatment to prevent rust and corrosion. Most manufacturers recommend that where metal roofing is subjected to spattered oil, condensation or salt air, animal refuse or fumes, the surface and laps should be coated with resinous varnish or asphalt paint. For maximum life, all metal roofing and siding requires care and treatment. Therefore, the much lower initial cost of USS Galvanized Corrugated Sheets becomes of primary importance.

Ease of installation

Width of sheets is, of course, a factor in easy installation. But with USS Galvanized Corrugated steel sheets you don't need expensive nails or special washers... workmen aren't nearly as apt to put an accidental hammer blow clear through the sheet... and additional scaffolding is rarely necessary, because with steel you have added structural strength.

What about heat reflection?

There is very little difference in the heat-reflecting qualities of any metal roofing at a distance of 12" or more below the roof. Heat comes from three sources—1) radiation from the ground, 2) from the sky, and 3) from horizontal sources (wind, etc.). If heat is a critical problem, the best recommendation is a metal roof with the top exterior painted white, the bottom interior painted black.

Fire resistance

Let's compare the melting points of two metal roofing materials. Aluminum melts at approximately 1218°, steel at 2800°. Thus at 1225° some types of roof are completely destroyed. At the same temperature, however, a steel roof remains intact and relatively unharmed.

These are the facts to keep in mind the next time you need roofing and siding.

For economical, long-lasting buildings, specify USS Galvanized Corrugated Sheets.



USS Galvanized Corrugated Sheets

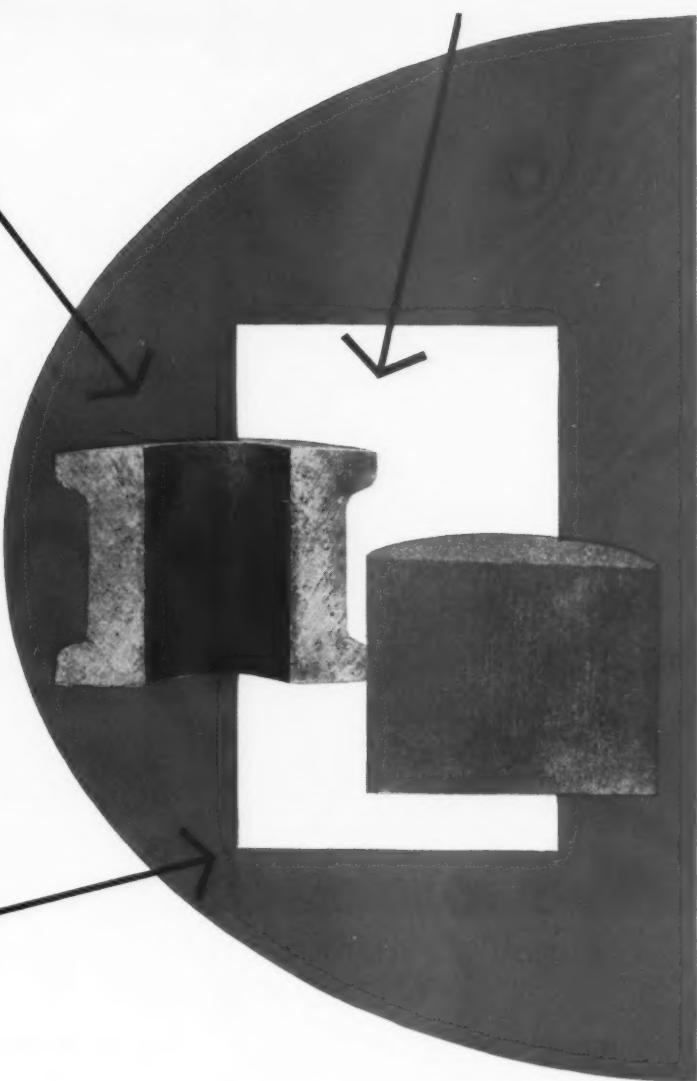
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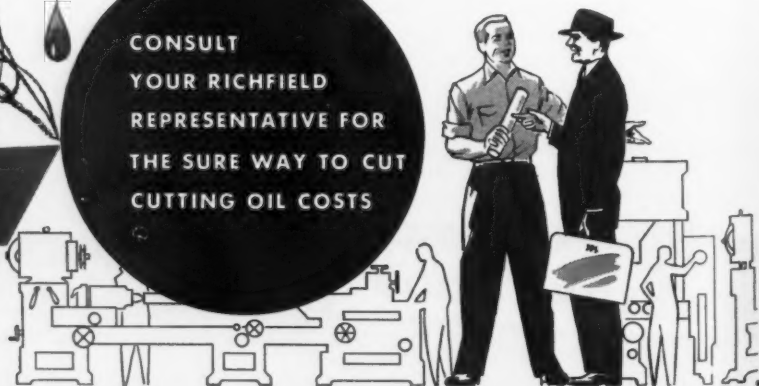
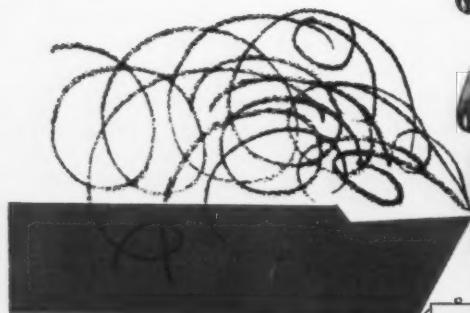
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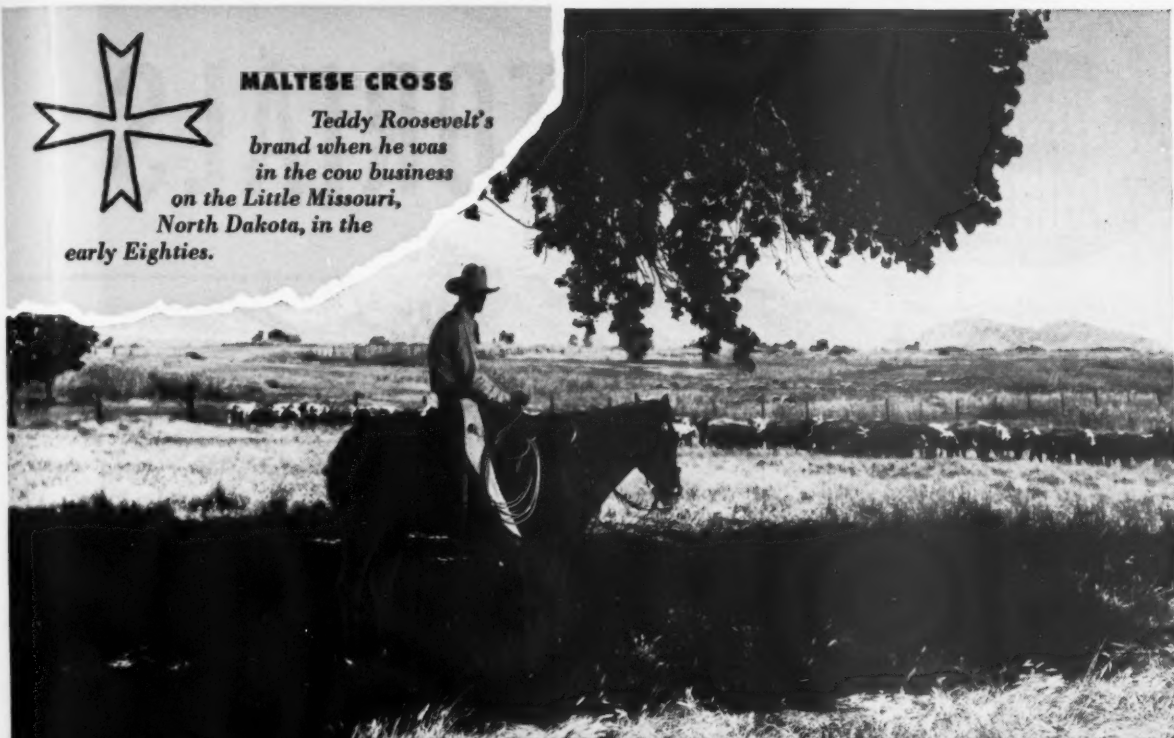
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Salutary object lesson

ONE MAN'S poison isn't necessarily another man's meat, if we may be permitted the liberty of reversing and distorting a familiar adage.

In other words, this is no time for other Western communities to feel that the distress of Southern California over a smog situation is going to do them any good in the form of an exodus from that area. Smog or no smog, industry in Southern California is going to stay put because of marketing advantages and other favorable factors. The responsibility for Southern California smog is about equally divided between motor vehicles, backyard incinerators, and industry, and industry has taken care of most of its share of the responsibility.

The plight of Los Angeles and environs is, however, a salutary object lesson for other communities in the West. This area was encouraging and acquiring industry at a time when smog was a minor matter, when the word itself was unknown. Consequently, all the corrective measures had to be taken after the problem had arisen. Control had to be added to plants, whether new or almost obsolete, despite the fact that this expense might be greater than the depreciated or replacement value of the entire plant. It was the most expensive way out, but it was inevitable.

While air pollution control may seem to be only a remote possibility elsewhere in the West, the continual population growth and the need to serve these markets are two signs that should be heeded. The only safe course for industry is to anticipate the situation and install enclosed processes or recycling equipment at the outset when the plant is designed, wherever it is located. Then if it becomes necessary to put in air pollution control equipment later, it can be done at a far more reasonable cost.

Inevitable result

AS WE SEE IT, two facts set forth by President Paul Kayser of the El Paso Natural Gas Company at the California Manufacturers Association convention will inevitably force Congress to amend the Natural Gas Act of 1938.

First, the known natural gas reserves of the country have declined from 28.94 years in 1948 to 22.89 years in 1953. Second, the U. S. Supreme Court has held that the law covers the production of gas, and the Federal Power Commission must regulate the price of gas in the field at the wellhead.

Since the only way to discover more gas is by the financially hazardous method of exploration in the hope of adequate profit, such price regulation will destroy the incentive to dig wells.

Let's see one

RECENTLY the Los Angeles Rotary Club heard a call for business to provide a new balance sheet on the values of a company's citizenship, its reinvestment of its earnings for future growth, and, most importantly, its success in handling the human factors which in the last analysis are its very bone and sinew.

The speaker was not a college professor but Elisha Gray II, president of the Whirlpool Corporation, which has forged its way to the top of the domestic washing machine industry. Said he:

"No pay check will ever buy the devotion of a man's heart for his job or his loyalty to the company for which he works.

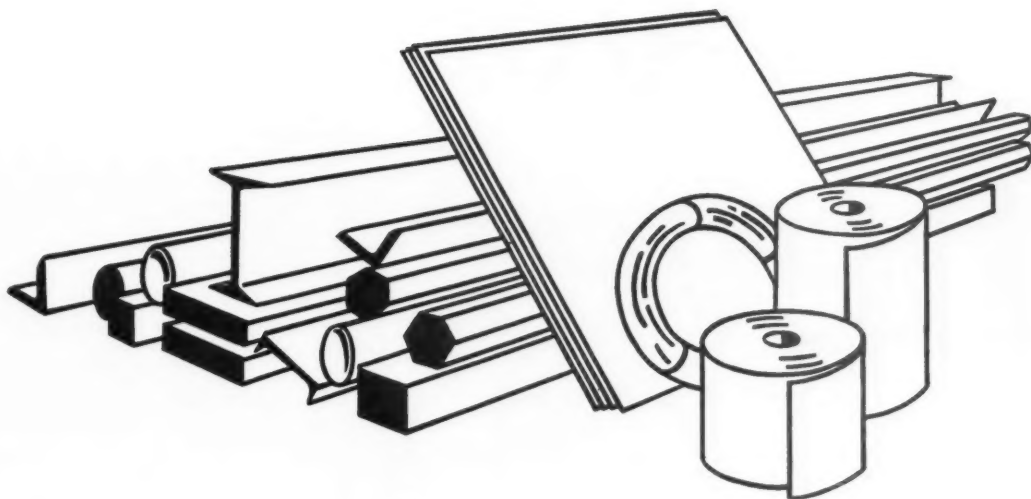
"Far more convincing than all the house organs, bulletins, employee magazines, and factory communications with which we inundate our employees is the example set by the company executives themselves.

"If the man on the assembly line knows the product does not represent the best in engineering, that its quality is shoddy and the company's advertising deceptive, how can you expect him to have any pride in his company? And what incentive does he have to perform his job in a craftsmanlike manner?

"Let's construct a balance sheet that I think the country at large has been trying to tell us it expects of business. Let's consider dollars as only one ingredient in this formula, essential but meaningless without the supporting factors."

We agree with Mr. Gray's reasoning. Business just can't escape these responsibilities in the long run. But what kind of CPA's will we have to audit these balance sheets?

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LETTERS

Contributions to this column from our readers are welcome. Names will be withheld from publication if requested. Unsigned letters will be disregarded.

Comment from Fallbrook

Editor, WESTERN INDUSTRY:

I believe the second paragraph of your editorial ["Unfinished work," October 1954, page 22] is extremely important to the people of California and am surprised that more people have not realized the implication of the Government's position.

Our people sincerely appreciate editorials such as yours and realize that the only reason we have received any consideration at all has been because of the interest aroused by such articles.

GEORGE F. YACKEY
General Manager
Fallbrook Public Utility District
Fallbrook, Calif.

Surveys—past and present

Editor, WESTERN INDUSTRY:

We are very much interested in your series of articles on "Industrial Management Methods for Small Plants Surveyed," the first of which appeared in your September 1954 issue. We would like to obtain several prints of same if it is possible.

We would also like to inquire concerning the previous surveys mentioned in the lower left hand corner of page 50 in your September 1954 issue. May we obtain several prints of these?

GORDON MCCLURE
Quality Control Supervisor
Industrial Engineering Supervisor
Sylvania Electric Products Inc.
Mountain View, Calif.

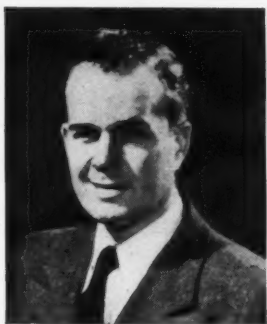
Thank you note

Editor, WESTERN INDUSTRY:

The group of which I am a part wish to thank you for making WESTERN INDUSTRY magazine available to us.

The selection of articles is excellent and has been a source of ready reference. We look forward to each new issue.

C. M. MARTIN
Systems and Procedures Engineer
Hughes Aircraft Co.
Tucson, Ariz.



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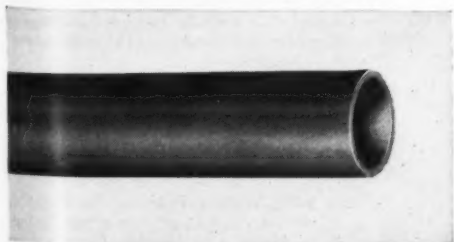
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CALENDAR OF MEETINGS

DEC. 13-15—*Inland Empire Industrial Exposition*, Coliseum, Spokane, Wash. Contact Neal Fosse, Washington Brick & Lime, E. 7621 Sprague, Spokane.

DEC. 26-31—*American Assoc. for the Advancement of Science*, 121st meeting, University of California, Berkeley, Calif. Contact Dr. Raymond L. Taylor, c/o Assoc. office, 1515 Massachusetts Ave. N. W., Washington, D. C.

1955

JAN. 10-11—*Northwest Frozen Foods Assoc.* convention, Olympic Hotel, Seattle. Contact Assoc. office, Title and Trust Bldg., Portland.

JAN. 12-13—*Northwest Cannery Assoc.*, annual convention, Olympic Hotel, Seattle. Contact Assoc. office, 514 Board of Trade Bldg., Portland 4, Ore.

JAN. 17-19—*Pipeline Contractors Assoc.*, national convention, Statler Hotel, Los Angeles. Contact Convention Bureau, Los Angeles Chamber of Commerce, 1151 S. Broadway, Los Angeles.

JAN. 24-27—*American Management Assoc.*, general management conference, Hotel Statler, Los Angeles. Contact AMA headquarters, 330 W. 42nd St., New York 36.

JAN. 27-28—*Fruit and Vegetable Sample Cutting for Cannery League of California*, Fairmont Hotel, San Francisco. Contact M. A. Clevenger, 215 Market St., San Francisco.

JAN. 28—FEB. 1—*Industrial Engineering Institute* (7th annual), University of California, Berkeley and Los Angeles. Contact Dept. of Conferences and Special Activities, University Extension, Berkeley 4 or Los Angeles 24, Calif.

FEB. 3-4—*Western Frozen Foods Processors Assoc.* convention, Hotel Senator, Sacramento, Calif.

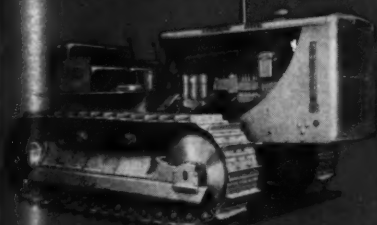
FEB. 3-5—*Colorado Mining Assoc.*, annual meeting, Denver. Contact Robert S. Palmer, executive vice president, 204 State Office Bldg., Denver.

FEB. 7-8—*California-Nevada Manufacturers of Carbonated Beverages*, regional convention, Biltmore Hotel, Los Angeles. Contact Convention Bureau, Los Angeles Chamber of Commerce, 1151 S. Broadway, Los Angeles.

FEB. 8-10—*Society of the Plastics Industry*, Reinforced Plastics Division, Statler Hotel, Los Angeles. Contact Samuel S. Oleesky, Micronics, Inc., 1614 W. 134th St., Gardena, Calif.

FEB. 9-12—*National Tool and Die Manufacturers Assoc.*, national convention, Ambassador Hotel, Los Angeles. Contact Convention Bureau, Los Angeles Chamber of Commerce, 1151 S. Broadway, Los Angeles.

FEB. 14-15—*Vertical Turbine Pump Assoc.*, Hotel Mark Hopkins, San Francisco. Contact H. DeVoe Rea, executive manager, 453 S. Spring St., Los Angeles.



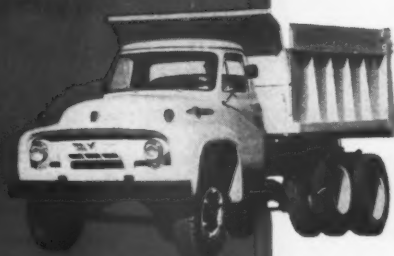
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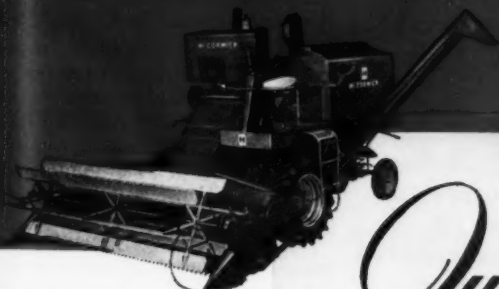
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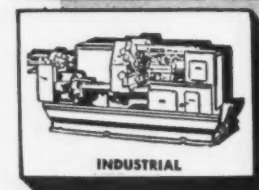
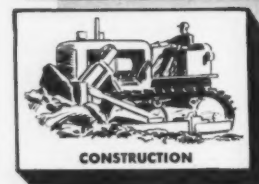
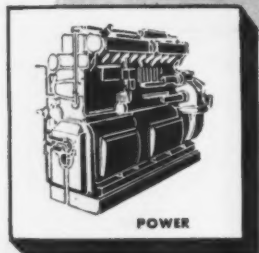
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THIS MONTH'S COVER

FOREST PRODUCTS are here to stay

THE NEXT twenty-odd years will see continued market growth for all Western forest products, and production will keep pace, but at prices that will encourage the substitution of competing materials. The period 1952 to 1975 is destined to bring further increases in population, technology, and standard of living, to be paralleled by a corresponding growth in construction, manufacturing, and shipping, the major markets for forest products. These are summarized conclusions of Stanford Research Institute.

Optimistic sections of the industry appear a little disgruntled at the prospect of dwindling markets on some fronts, destined to be taken over by more efficient, lower cost competing materials. But SRI can only compute future conditions by projecting present-day conditions and operating efficiency. A challenge, then, still remains. If the forest products industries were to really settle down to the efficiency and stability that could be theirs, they might very well do better than SRI expects.

On the cover is the mill and log pond of Michigan-California Lumber Co. at Camino, Calif. This member of the Western Pine Association manufactures 160,000 bd. ft. of lumber per eight-hour shift and grows its own trees besides.



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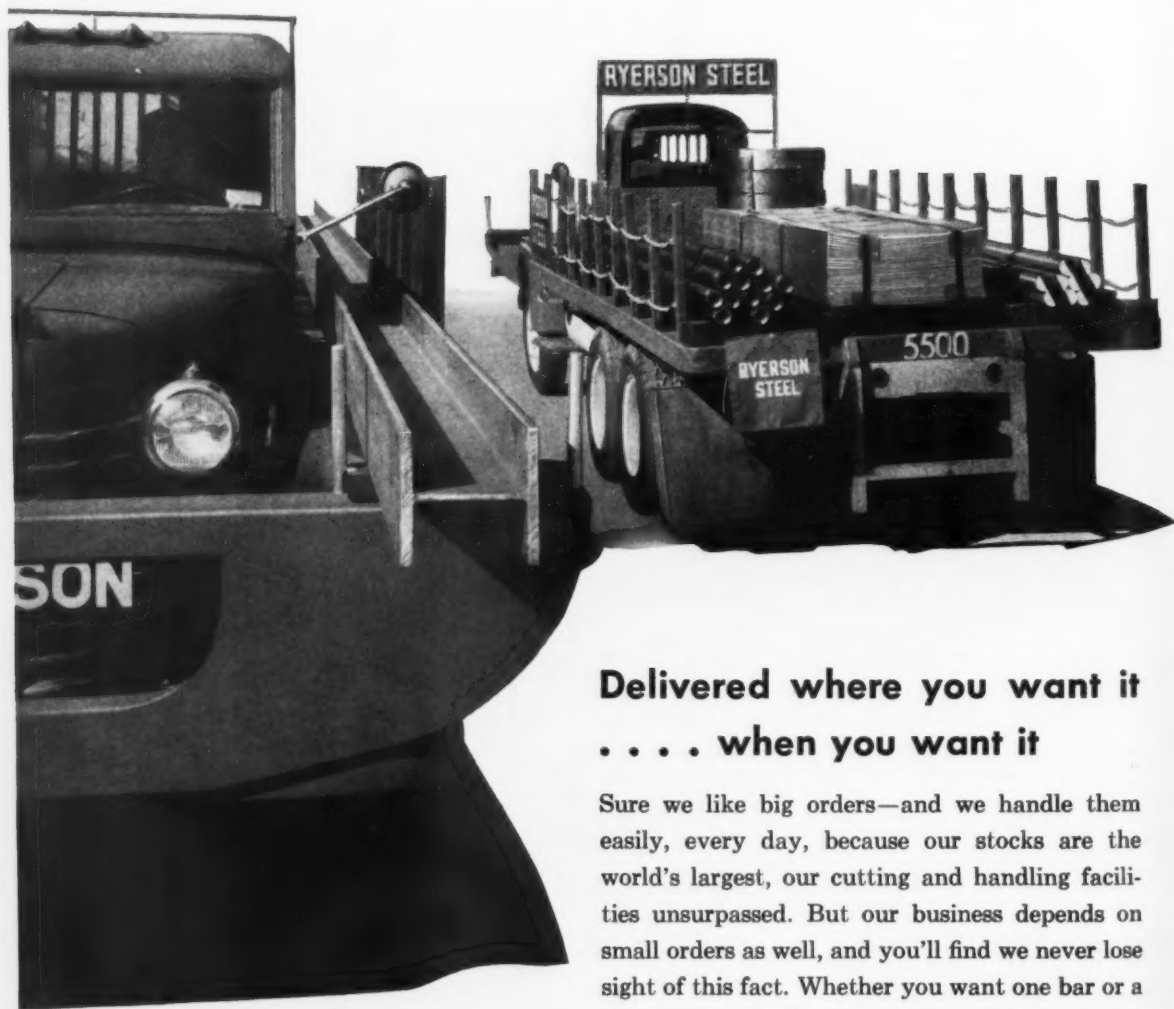
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High pressure feed pumps point to cheaper power

Here are problems and prospects of design and operation, from an expert

Pump progress

Some 20 to 25 years ago, 1,200 pounds was considered to be high pressure for pumps. At that pressure, barrel type pumps of a single volute design, with inner cases of cast iron or cast steel, found their way into the power industry. Since then, pump manufacturers have been learning from experience how to design pumps to handle liquids at high pressures and temperatures. A good deal of this accumulated know-how came from pumping liquids other than hot water for the petroleum industry.

The demand for higher speed boiler feed pumps for industry is growing, for six very good reasons. Advantages of pumps running at speeds up to 6,000 rpm., in comparison with those running at only 3,550 rpm., are:

1. Lower cost
2. Lesser number of stages
3. Same or better efficiency
4. Lower maintenance cost
5. Simplified, smaller castings
6. Saving in erection space

By
V. LOBANOFF

Chief Engineer
United Centrifugal Pumps
Oakland, Calif.

SUDDEN and unexpected demands on the West's industry, including public utilities, since World War II, have brought about the need for boiler feed pumps able to meet the resulting high speed, high pressures, and elevated temperatures consistent with cheaper power. And power plant design engineers indicate that pressures and capacities for boiler feed pumps are still rising.

Economy of design in power plants indicates still cheaper power at even higher pressures, and these higher pressures from boiler feed pumps mean more and more stages at 3,550 rpm. This need for more stages means longer units, and some present day units are already reaching limited mechanical spans. Furthermore, more stages mean more difficulty in manufacturing from the standpoint of casting and machinery accuracy. Finally, more stages mean higher horsepower and heavier shafts, and the latter will cause pump efficiency to drop. Needless to say, this pushing to higher stages also means higher cost of boiler feed pumps, and a higher cost of maintenance.

A consensus of power engineering opinion feels that the speed increase of boiler feed pumps should be gradual, with speeds up to 6,000 rpm. covering the required increase of boiler feed pump discharge pressures. At speeds between 5,000 and 6,000 rpm., predicted increases in pressure will be covered, and pump manufacturers are capable of building these units commercially. The performance of boiler feed pumps is well known, and their operation at 5,000 or 6,000 rpm. will not differ substantially from 3,550 rpm. units.

A cost comparison

The following specific example will illustrate cost comparison between 3,550 and 6,000 rpm. barrel-type boiler feed pumps with these performance characteristics:

TDH	2,300 psi.
Capacity	600,000 lb. per hr.
Temperature	300 deg. F.
Horsepower	2,500

The pump at 3,550 rpm. will be a 13-stage unit. If the price of this pump is considered as 100%, then:

Rpm.	Size of unit	Cost reduction
4,000	11 stages	10%
4,500	9 stages	15%
5,000	7 stages	25%
5,500	7 stages	30%
6,000	6 stages	35%

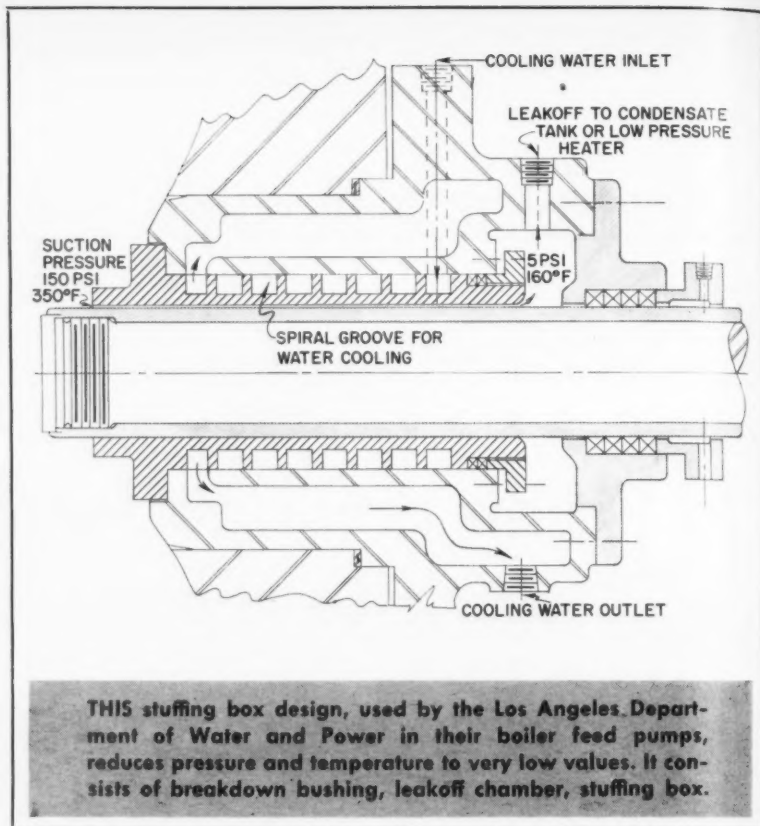
In this direct comparison of a 6,000 rpm. and a 3,550 rpm. pump we find that we have reduced the number of stages from 13 to 6, with a resultant 35% reduction in cost. Specific speeds of pumps selected are not the same. They are lower in most cases, but still high enough to maintain the same efficiencies for speeds ranging between 3,550 and 6,000 rpm.

Changing speed on a variable speed driver is no problem, but costs can be reduced on a constant speed driver with hydraulic coupling under the following arrangement. Speed increase will be accomplished with a gear increaser, the cost of which is approximately the same within the ranges of ratios 2:1 to 6:1.

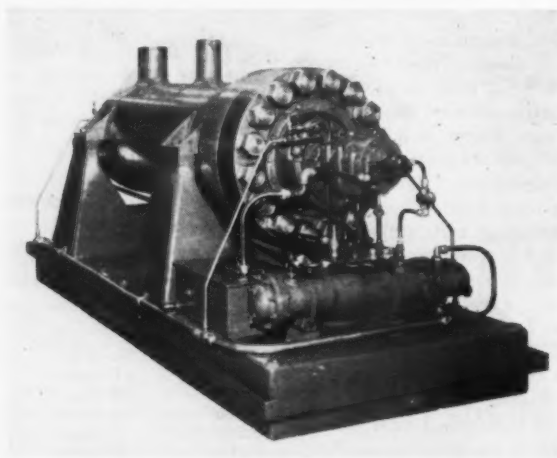
The normal arrangement of equipment will be pump, gear increaser, hydraulic coupling, and driver. Since hydraulic couplings are not manufactured at speeds higher than 3,600 rpm., both the hydraulic coupling and the driver will have to 1,750 rpm. units. This motor is considerably cheaper than the 3,600 rpm. motor, the differential being great enough to compensate for the increase in price of a hydraulic coupling and gear increaser and still yield savings.

Stuffing boxes do not offer many problems at high speeds. Shaft diameter will be smaller so that conventional packing will run at approximately the same surface speeds. Besides, mechanical seals are coming into more frequent use in boiler feed pumps, even at high speeds, and should eventually replace standard mechanical packing.

Many types of stuffing box designs are being adapted to boiler feed pumps. One type in particular is particularly adaptable to high speed pumps and is being used by the Los Angeles Department of Water and Power in its boiler feed pumps. It



BELOW: A typical high-speed double-case boiler feed pump designed to meet new demands of an expanding West.



consists of a long breakdown bushing designed with a spiral groove for water cooling, leakoff chamber, and small auxiliary stuffing box. This design reduces pressure and temperature to very low values. Leakoff is connected back to a low pressure vessel, and only a small stuffing box with $\frac{1}{4}$ in. square packing is necessary to prevent splashing of water into the bearing. The small amount of leakage has no effect on pump performance and should be further reduced by smaller shafts at higher speeds.

When a hydraulic coupling is used as part of the driving unit, the main regulating valve is eliminated, and reduction in pump load is accomplished by a reduction in speed effected by the hydraulic coupling. A 20% maximum reduction usually covers the required variation in head in the boiler feed pump. The pump, therefore, never reaches operation close to shut-off capacity, so that when a hydraulic coupling is used the continuously rising curve loses its significance. Flatter curves, in this respect, will be more advantageous since they require a smaller number of stages for the same head and less reduction in speed, thereby gaining efficiency through the use of a hydraulic coupling.

Effects on NPSH

NPSH stands for net positive suction head, an arbitrary standard expressing basic requirements for proper pump operation. For every operation the NPSH requirements must be considered both for the system and for the pump within the system.

Under similar operating conditions, specific speed and cavitation constant remains the same regardless of running speed. If there are no other influences, NPSH is proportional to the square of the speed. Several tests, made on the same pump at different speeds, have been undertaken to prove theoretical calculation of the effect of speed on required NPSH.

Results indicate that any pump is safer against cavitation at higher speeds than at lower speeds, if the cavitation constant $\sigma \left(\frac{\text{NPSH}}{H} \right)$ is the same. This might seem to indicate that NPSH does not change with the square of the speed, but with some smaller exponent. The reason for this, probably, is that at higher speeds the fewer particles of liquid have less time to absorb the necessary head to evaporate and explode while passing the low pressure zone.

These results might also lead to the belief that manufacturers' shop tests for NPSH at low speeds are more severe than actual high speed running conditions.

With regard to temperature effect: To compensate for quick load changes and variation imposed on de-aerator heater, it is necessary to protect pumps with a considerable amount of additional NPSH. However, if temperatures and vapor pressure could be maintained, hot water pumps would require less NPSH than cold water pumps.

High temperatures mean high vapor pressure, and with an increase of temperature, pump suction pressure will likewise be increased. The effect of cavitation, at high suction pressure on hot water is considerably smaller than on cold water under the same NPSH. This is because the same amount of vapor in the liquid and in the cavitation zone occupies less volume at higher pressure.

Tests show cavitation in a pump while pumping gasoline at low vapor or suction pressure and a given NPSH, and no cavitation at the same NPSH while pumping propane at much higher vapor or suction pressure. For

higher speeds and higher temperatures, NPSH requirements will be increased, but the increase will not be as great as by present day methods.

Hydraulic design

If the variable speed driver is available, it is easy to select the best specific speed pump for a given head capacity condition. Higher speeds may very well provide a considerable gain in efficiency. With a constant speed drive, the speed is fixed and the number of stages is varied to reach the best combination of a specific speed and efficiency. The largest obstacle in the path of high speed operation is the availability of drivers. As pressures increase, the variable speed drivers should prove more and more advantageous as speed increases. Steam turbines will undoubtedly stage a comeback in power plants as demand for higher speed boiler feed pumps increases.

Critical speed

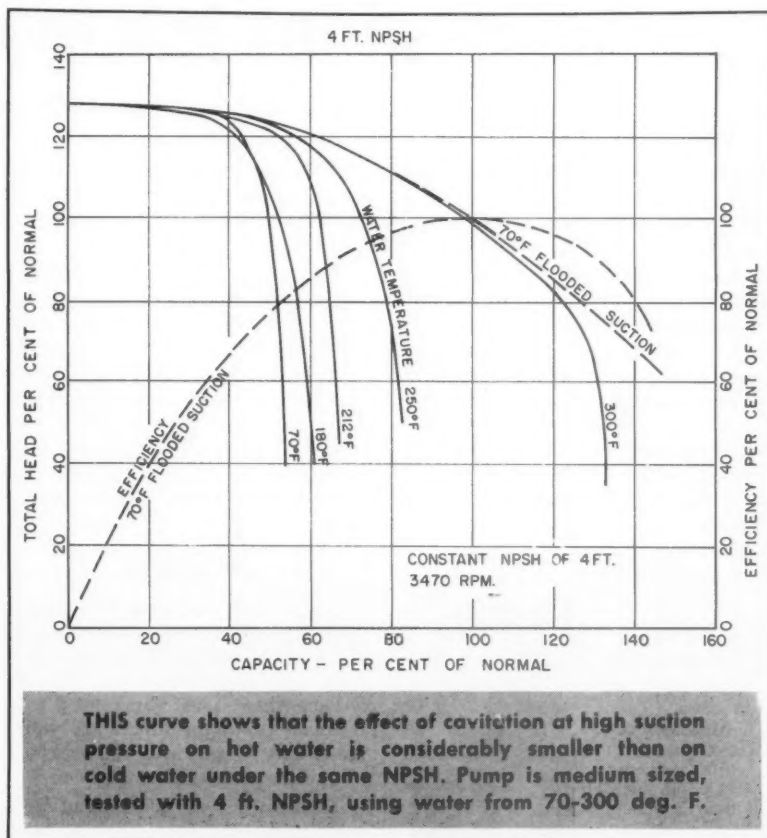
Critical speed should not be any more of a problem at 6,000 rpm. than it is at 3,600 rpm. As a matter of fact, I have yet to see any trouble caused by critical speed in boiler feed pumps,

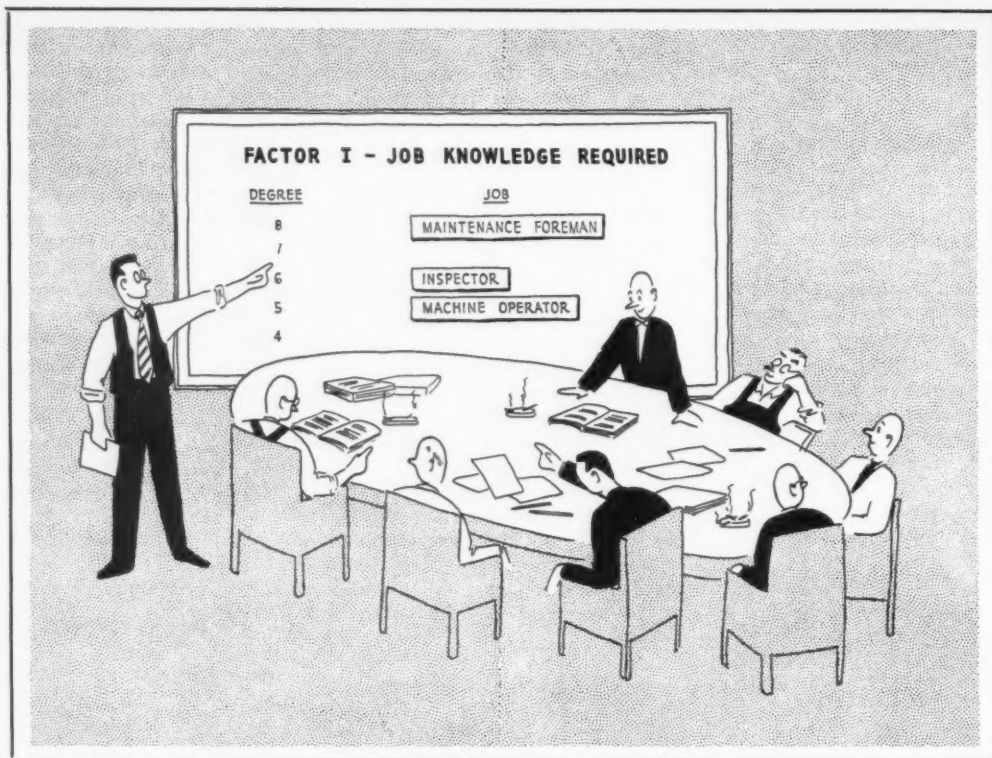
as long as normal wearing ring clearances are maintained. This can be explained by the fact that each wearing ring acts as a hydraulic bearing. Many of these bearings, spaced at very short intervals and having pressurized liquid annularly distributed in close clearances, make shaft vibration due to critical speed almost impossible. Centrifugal pump wear will result in increased wear ring clearance. When the clearances are opened to the extent that the hydraulic bearing becomes ineffective and pump efficiency is reduced, the pump is ready for normal maintenance repair.

In addition to barrel-type boiler feed pumps, higher speed prospects appear favorable for the horizontally split pump. Today, the dividing line between barrel-type pumps and horizontally split single case pumps is 1,200 psi., but I cannot see why it cannot be raised to 1,500 psi. or higher.

By going to higher speeds and higher dividing pressure, horizontally split single case pumps should cover a wider field of application, giving pump users considerable savings in both the cost of unit and maintenance.

This article is based on a talk given before the American Society of Mechanical Engineers in Los Angeles.





CONFERENCE-type discussions are the heart of thorough job evaluation.

Small plant job evaluation

Here's how a Westerner puts it to work . . .

WHAT'S your reaction to job evaluation? Unnecessary? Too fancy? Something that's all right for large companies—but a fancy technique that you can't be bothered with? If it is, you may be missing a good bet for upping productivity.

A well-balanced, realistic wage scale, based on practical job evaluation, can actually increase productivity. Case after case serves to prove that wage problems can—and do—put a damper on men's will to work.

Maybe you have heard these stories before:

- Lots of wage grievances, the kind in which Joe says, "I do the same work as Sam—why don't I get the same pay?"

- A union that's hard to deal with—the kind that often looks for an ulterior motive in management's sincere efforts.

- Trouble getting good people—and keeping them. Turnover too high because rates aren't competitive.

- Jobs for which there's no good reason for their being paid what they are—they're just out of line with the rest.

What is it?

Simply, job evaluation is an organized, common-sense way of comparing the worth of one job to another. It is used to develop a logical job "line-up"—from those jobs worth least to a company to those which are worth most. This job line-up is the backbone of any sound wage payment plan.

To many people, job evaluation is associated with big companies, large

staffs, and complicated management techniques. Looked at in this light, it's small wonder that smaller firms have shied away. But this needn't be so.

An example

Local Manufacturing Co.'s 150 employees worked at about 60 different jobs divided among four distantly related departments.

Local had recently become organized by a union new to the area. Management and the union just hadn't got used to working together. Wage rate grievances were commonplace. A number of these came about because Local had several jobs with the same title, but a different degree. The common complaint was, "I'm doing the same work as an 'A' operator, yet I am classified as a 'B'. I guess the foreman just doesn't like the way I part my hair!" (As a matter of fact no two foremen had the same idea as to what did make an "A" operator!)

Local had never tried to develop a plant-wide relationship among all its

By
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McKinsey &
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jobs. Jobs in any one department were pretty well lined up with one another, but in a small plant people compare pay rates with friends in other departments, too. Some jobs calling for definitely less skill and responsibility were getting higher base rates than other jobs worth more to the company.

With new industry moving into the area, Local just couldn't keep good, skilled help. Meeting competition on one series of related jobs still left the company out of line on the rest.

Approaching the problem

These conditions pointed up the need for a sensible scheme for setting wage rates. But such a method had to be built in an easily understood way, so that its fairness could not be questioned and there would be no mystery about it.

In facing up to the problem, Local decided to ask for union help in comparing the worth of jobs. A joint committee was set up with three union officers and three members of management. (Actually, the problem was of nearly equal concern to the union and to Local's management). Then they started on a three-step program together.

Describing jobs

The first order of business was to agree on an accurate description for each job in the plant. Detailed information was gathered from employees and supervisors—in writing, through discussions, and by actual committee observation. This fact-finding was important for another reason. It made it necessary for all committee members to get out and get first-hand facts about the jobs, in place of emotional opinion.

Evaluating jobs

Armed with fresh knowledge of the jobs, the committee gathered around the table with a large display board set up at one end. Conference type meetings encouraged group participation and group agreement. The conference setup was headed by a leader who had responsibility for setting the pace, guiding discussion, and cutting down time-wasting. Frequently, an experienced observer, sitting on the sidelines, was asked to suggest ways for ironing out the most difficult points.

First, factors were chosen by the group describing the kinds of skills, responsibilities, effort, and exposure to unfavorable working conditions required by jobs. Each factor was given a percentage weighting. These weight-

ings resulted from the group's judgment as to the amount each factor contributed to the total worth of any job in the plant. This decision actually hinged about the question, "What are the real reasons that some jobs should be paid more than other jobs?"

Then the "factor ranking" started. All jobs were ranked on the first factor, before the process was repeated on the next factor. The key here was to look for distinct differences in the jobs' requirements for each factor.

As decisions were made that Job X required more skill than Job Y, but less than Job Z, a pattern began to develop. It was shown by placing job-name cards on the display board for all to see. These rankings, with reasons why, were also recorded. Jobs calling for equal amounts of a particular factor were grouped together and given the same point value.

Developing job grades

As soon as complete rankings on all factors had been hammered out, the total points accumulated by each job were totaled. A final job line-up was established this way—ranging all the way from those jobs which had the lowest point scores to those which had scored the highest totals. Jobs found to have similar numbers of points were put in the same "job grade." This was the same as saying that there was no describable difference in the worth of those jobs.

This final line-up was tested against the joint committee's over-all judgment. Where questions arose, the committee dug back to see how jobs had been ranked on each factor. If no original judgment errors could be dis-

covered, no changes in final ranking were made.

By the time these evaluation sessions were over, both union and management people were on a friendly, first-name basis. They had convinced themselves that they could work out a sticky problem through their combined good judgment.

At this stage, the job line-up was "priced" according to prevailing wage rates in the area. Each job grade was assigned a dollar range, from \$X per hour, minimum, to \$Y per hour maximum. Local then had a soundly-conceived new wage payment plan! It was put to work immediately.

Benefits to all

After several months, these benefits became obvious:

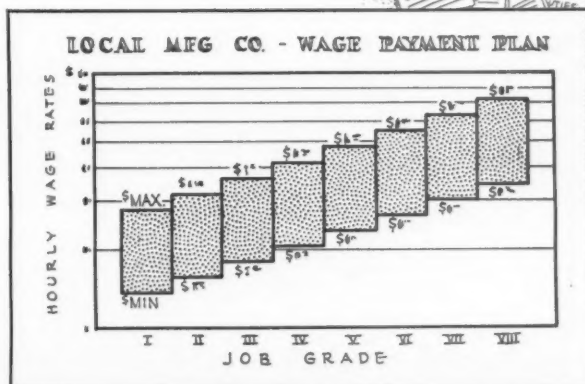
1. All kinds of grievances dropped off—but particularly those concerning wage payment. Workers began to feel that management sincerely wanted to pay them for the kind of work they were actually doing.

2. Union cooperation had resulted in union understanding. The veil of mystery shrouding the development of pay scales had been dropped. Working on this common problem also helped committee members to better understand each other as human beings. This new spirit of cooperation carried over into other company-union relationships with good results.

3. Unfair rate differences among jobs in the plant were eliminated.

4. Local Manufacturing became a real competitor for skilled help. The "this is a temporary job till I can find something better . . ." philosophy lost its popularity.

WRITTEN job descriptions (at right) are the first step in developing a logical wage payment plan (below). Rate ranges relate to those of similar jobs in the same area.





ABOVE: Rack-mounted aluminum parts are immersed in a mixture of mineral and organic acids, where they serve as anodes in the electrochemical process.

BELOW: A typical batch of aluminum parts after receiving a ceramic coating.



Ceramic

A NEW electrochemical process—a close relative to electroplating methods—builds up tough wear- and corrosion-resistant ceramic coatings on the surfaces of aluminum products without using any heat.

This new technique uses electrical current for the purpose of converting aluminum surfaces into relatively thick deposits of aluminum oxide at Sanford Process Co., Los Angeles.

Materials to be coated are vapor degreased or cleaned in an alkaline bath much the same as if they were to be electroplated, although they do not have to be quite as clean as parts which are to be plated. Then areas that require no ceramic coating are masked by means of acid-resistant plastic tape and cellulose acetate butyrate dip coatings.

Next, the parts are mounted on metal racks suspended in a stainless steel tank, containing a mixture of mineral and organic acids. The latter electrolyte is chilled to temperatures of 0 to 15 deg. F. by circulating it through a refrigeration unit above or adjacent to the tank so that its acid constituents will not attack the aluminum components.

Aluminum conversion

Then, with the parts themselves serving as anodes and the sides of the stainless steel tank serving as a cathode, about 15 to 150 volts of current are applied so as to produce a "heat factor" which will convert aluminum into aluminum oxide.

Function of the organic acid in the electrolyte is to distribute current evenly and to sequester metallic ions which are taken into the solution by solubilizing aluminum. This makes it possible to obtain aluminum oxide coatings of consistent hardness and uniform thicknesses.

Mineral acids serve the purpose of solubilizing aluminum so that oxygen

coatings for aluminum

New heatless process provides: friction and corrosion resistance, insulation, reclamation of overmachined parts

will come in contact with the surfaces of the parts being processed.

The lifespan of the electrolyte has not been determined, but it is known to be long enough to make the cost of the solution an unimportant item. For example, one solution in use has met daily production requirements for more than eleven months without showing signs of exhaustion.

Processing tanks in use at present are welded structures with capacities ranging from one to 8,900 gal. Substantially larger tanks could be satisfactorily utilized if parts dimensions or production requirements should make their construction desirable.

The power required to operate a given tank depends on the number of square feet of work being processed at any given time, each square foot of work necessitating the use of about 15 amp. of current.

Uniform coatings

Oxide coatings being built up by means of the new process have such uniform and such easily-controlled thicknesses that they have been applied in a number of circumstances for the purpose of reclaiming overmachined parts. Their thicknesses are controlled simply by limiting the amount of time during which parts serve as anodes in the electrolyte. About 10 minutes of processing time will yield an 0.0005-in. coating, while 55 minutes of processing time will produce an 0.006-in. coating.

Where the ceramic coatings are to be used as a base for organic coatings following a processing cycle, the finished parts are merely rinsed in cold water and dried. Where the ceramic coatings alone are to be used, the finished parts are rinsed in cold water and then soaked in hot water for about an hour in order to minimize the porosity of the aluminum oxide.

The colors of oxide coatings produced by means of the Sanford process

depend on the compositions of aluminum alloys and the thicknesses of their oxide layers. For instance:

1. A thin coating on 75S stock has an amber hue; heavier coatings have brown, black, and gray-black colors.
2. A thin coating on 61S stock has an amber hue; heavier coatings have light and dark black colors.
3. A thin coating on 24S stock has an amber hue; heavier coatings have light and dark blue colors.

Flame spraying

If necessary, ceramics with other colors and properties could be flame sprayed over aluminum oxide coatings because the latter have more than enough heat resistance to prevent easy damage to their parent metals.

Costwise, the process permits the application of durable ceramic coatings for about 40% less than the cost of hard chrome plating—which is one of the few finishes that will impart comparable wear resistance to aluminum surfaces.

The new coatings have much better bond strength than electroplated finishes because, as already mentioned, they are integral components of their parent metals.

Tests recently conducted by a government agency to determine the ability of these coatings to prevent corrosion disclosed that they will withstand more than 13,000 hours of salt

water spraying. The best of previously-used aluminum coatings, subjected to the same tests, prevented corrosion for no more than 250 hours.

Gale Electronics Co. of Los Angeles currently specifies the use of Sanford coatings on all items like forms for coils. Besides having enough dielectric strength to insulate the aluminum parts where up to 4,000 volts of current are employed, the coatings substantially reduce cost and weight factors and are much less susceptible to damage than previously-used insulation materials.

In racing cars, aluminum pistons usually become so worn that they must be replaced after every third race. However, a recent test disclosed that such pistons can be as good as new after 35 races if they are finished by means of the Sanford process. All of which helps explain why the new process is achieving considerable popularity in the manufacture of valves, cams, cylinders, abrasion strips, brake discs, and other parts which must withstand considerable friction.

Strength increased

Despite their extreme hardness, coated parts are not excessively brittle. In fact they usually have more mechanical strength than uncoated aluminum components.

In a number of instances, the ceramic coated parts have been ground, lapped, and otherwise machined like hardened steel products where special details or dimensions were specified.

Where parts are electroplated, it is usually impossible to build up satisfactory coatings in holes and other recessed areas (which may be relatively shallow) due to the poor "throwing power" of current in an electroplating solution. No such difficulties have been experienced in using the Sanford process. In fact, the internal surfaces of aluminum tubes up to ten feet in length with relatively small diameters have been satisfactorily coated.

Fatigue and tensile test results

Stress, PSI	Uncoated aluminum specimens	Test specimens	
		0.0005 in. coating	0.0003 in. coating
15,000	—	—	1,531,920
22,500	1,514,760	1,519,440	—
25,000	—	1,464,840	1,440,100
30,000	391,560	—	425,880
35,000	199,680	191,880	310,440
45,000	79,560	107,640	87,680
55,000	24,960	32,760	—
Tensile strength, PSI (average of 5)		67,700	68,250



THIS battery of resin overlaid fir plywood electroplating cells saved Tacoma Powdered Metals \$30,000 in four years. Tanks show no deterioration.

Plywood acid tanks

Here's how one Westerner's experiments saved him more than \$30,000 in four years

MORE than \$30,000 has been saved through the development of light-weight high-strength plywood plating cells used in the manufacture of 10,000 lb. of powdered iron daily by Tacoma Powdered Metals Co., Tacoma, Wash.

Powdered iron, used for self-lubricating bearings and other items, is being produced under a patented new process that requires a battery of fifty-four 350-gal. capacity electroplating cells. Cell tanks are in continuous use and constantly filled with an acid electrolytic fluid.

Lumber tanks were used during the first three years of the firm's seven years of operation, and they proved completely unsatisfactory. The necessity for heavy framing and tie-rod reinforcement on all four sides, plus constant leakage from the numerous seams found in this type of tank, made a change to some other type of construction imperative.

For the new tanks, the company had its choice of plywood or rubber-lined steel. Cost estimates showed steel tanks at between \$600 and \$750 each, while a design for a resin overlaid fir plywood tank was developed at an actual construction cost of only \$140.

Plywood construction, therefore, offered considerable economy. The only question was durability. Performance has since answered any question on that score.

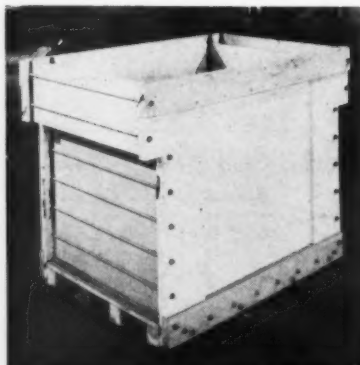
"We've had the tanks in service for

four years now, 24 hours a day, and there isn't a sign of deterioration," W. L. Douglas, company president, points out.

The material chosen combines the size, strength, and durability of plywood with smooth, hard resin-fiber surfaces. Such overlaid panels with hit resin surfaces are acid-resistant and bonded with 100% waterproof glue; the industry grademark EXT-DFPA identifies such plywood, intended for exterior uses or where subjected to water or moisture.

Survive severe use

In the process of producing powdered metals, hydrochloric acid with a pH of 1.0 to 3.0 is used, subjecting the tanks to a severe acid condition.



ELECTROPLATING tank before resin painting.

The process is a constantly punishing one, and the tank interiors are often gouged. This would require replacement of an entire tank if the insulation were of rubber-lined steel. With the overlaid plywood, a gouge does not necessarily impair a tank. When damage is severe enough to require repair, only one portion of a tank needs to be replaced.

In direct contrast to lumber, plywood panel construction eliminated seams, reduced tie-rod support from four sides to two, and insured against costly leakage. It also minimized framing, an expensive detail of construction with ordinary planking. This produced an extremely light but strong tank which is more easily handled when empty.

The tank design calls for a cell 3 ft. wide, 5 ft. long, and 4 ft. deep. Sides and bottom are two 1-in. thick panels. The bottom panel is mounted on 4 x 4's and the sides are bound at the top by 2 x 6 members. Resistance to bursting pressures is developed by 1/2-in. tie rods which run across both ends and the bottom. At the ends, the rods are run through 1-in. plywood plates applied against the side of the tank.

Each side and the bottom consists of one panel without seams. Ends are mortised into the bottom and into the sides. All joints are set in a soft plastic rubberized compound, and prior to installation the inside and outside of the tanks were finished with six coats of an acid-resistant phenolic vinyl paint.

Germanium power rectifiers

Another new tool for the industrial West

GERMANIUM transistors (equivalent to triode vacuum tube amplifiers) and diodes (two element rectifier tube equivalents) have enjoyed considerable publicity, but the electronic field is not the only place that germanium feels at home. Research engineers are beginning to realize the enormous possibilities in industrial power applications of germanium power rectifiers.

Relatively small size, high current density, and high efficiency are the most important advantages of this new rectifier, now available for use in heavy industry.

The purpose of a rectifier is to convert alternating current to direct current. Alternating current is generally accepted as the standard type of electric power in our homes and factories and its use has become second nature to us in this industrial age. But direct current, the original source of electric power, is again becoming an important part of industry's power supply.

There are many places where direct current offers a better way, or the only way of accomplishing a desired result. Among these are: operation of large motors with wide speed ranges continuously adjustable, battery charging, electroplating, and electrochemical production. The accepted methods for obtaining direct current by rectifying

alternating currents are by motor generator sets, mercury arc rectifiers, or dry type metallic disc rectifiers.

Prior to the successful development of the germanium power diode, copper oxide and selenium metallic disc rectifiers were used successfully. Now, however, the germanium rectifier promises to replace their use in many applications.

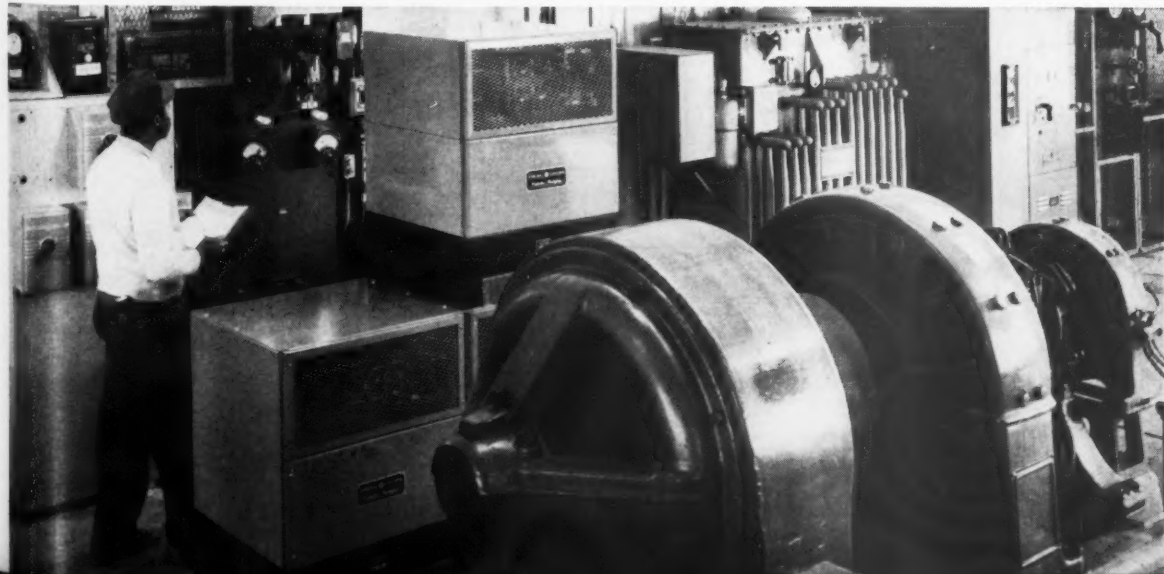
Germanium is not a plentiful metal and its present cost is quite high. Fortunately, a very small quantity of the metal performs a very large rectifying job. The metal is a by-product of the silver and zinc mining industry and must be carefully refined so that the final product is produced in a single crystal—a cigar shaped cylinder—and is then sliced into wafers about 20 mills thick and about the size of a dime.

Pure germanium crystals do not have all the required characteristics of a rectifier and must be alloyed with other metals to create the desired ef-



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METAL & THERMIT'S old MG set (foreground) sits alongside the new germanium rectifier units and a 300-kva. Pyranol transformer (back right).



fect. "P" type germanium is formed by alloying one surface of the germanium layer with a layer of indium while the opposite surface of the wafer is alloyed with a thin layer of antimony, forming "N" type germanium. Thus, in its final form, the rectifying element is a sandwich with thin layers of indium and antimony over the germanium wafer.

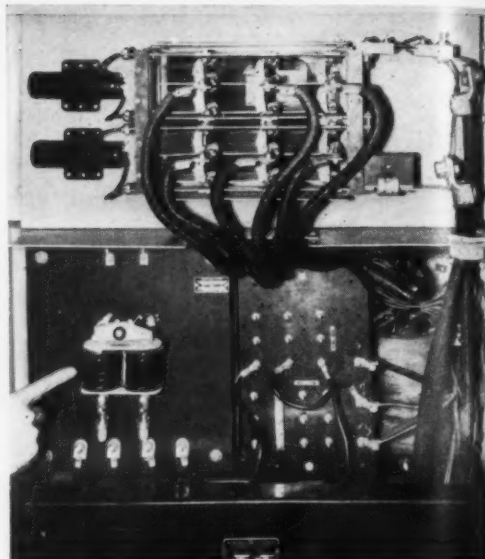
Close control of time and temperature is essential in the building of a rectifier of uniform electrical characteristics. When the sandwich is completed, the resulting atomic structure permits easy current flow from P to N, at the same time presenting a high resistance to current flow in the opposite direction. (Current flow in the conventional sense — opposite electron flow).

Characteristics

A germanium power rectifier consisting of a single disc has an amazing ability to pass very heavy currents in the rectifying direction while offering extremely high reverse resistance. One of these units, when properly cooled, will pass up to 75 amps on a half wave basis.

Small size in germanium rectifiers is due to a peculiar quality which permits extremely high current density in the active rectifying element. When germanium cells are operated at a cur-

CLOSE-UP of the rectifier portion of the equipment with panel removed showing the instantaneous overload protection.



rent density almost 1,000 times greater than copper oxide, both have the same internal voltage drop. Another outstanding feature of germanium is the ratio of forward to reverse resistance which is in the order of 1:400,000 at its optimum rating, while selenium rectifiers have a ratio in the order of 1:10,000.

Physical design of electrical connection for such a small device presents some problems. When adequate

copper terminals and sufficient heat radiating means have been attached to the rectifying disc, the active material becomes a very small part of the total assembly. Although high efficiency means that the total percentage losses are lower for germanium than for other types, the heat produced is concentrated in a very much smaller area.

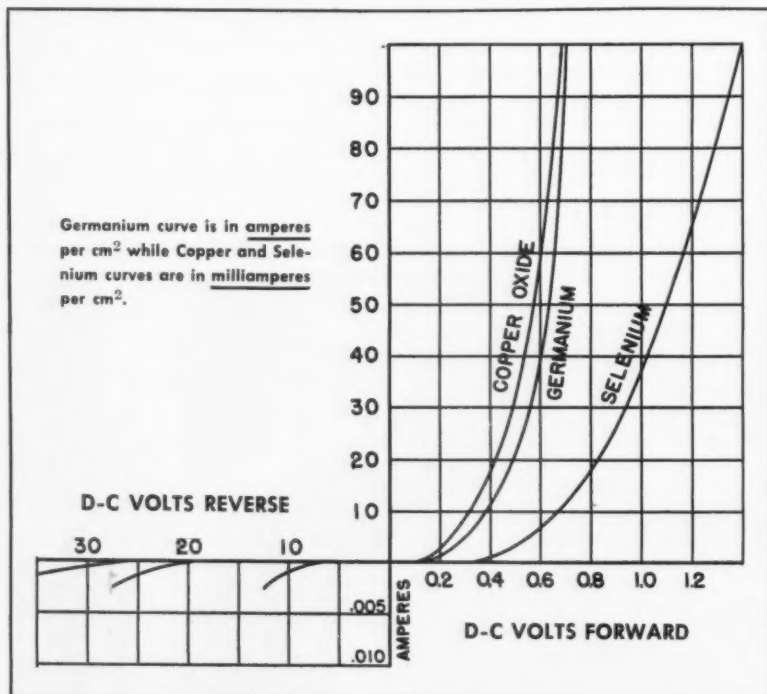
In all germanium power rectifiers some accelerated method of heat transfer must be used. Both forced air and liquid cooling have been tried, and recent developments indicate that liquid cooling is more promising, particularly when large ratings are involved.

Electrical connections

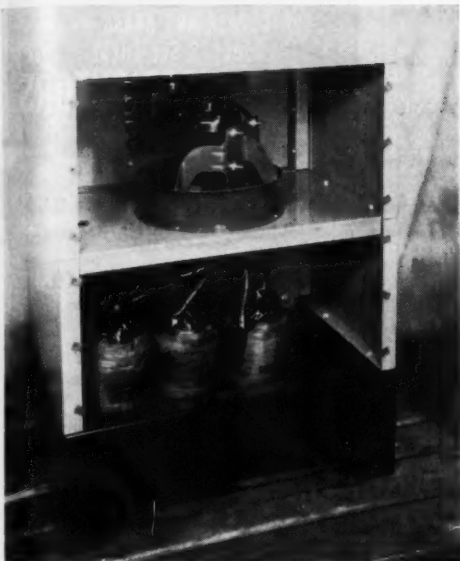
Germanium rectifiers can be connected in any of the conventional circuits used for rectifiers, but the individual cell can be operated at a voltage considerably higher than is possible with other metallic rectifiers of an equivalent rating. For example, let us consider a common, 3-phase connection which employs six rectifier cells and a secondary transformer that can be either delta or wye.

Six cells so connected have a maximum air cooled rating of 225 amps at 65 volts DC output. This is a surprisingly high rating for six small germanium cells. Such a group of cells, with its transformer and cooling equipment, constitutes a self-contained power supply; however, it can be connected in parallel or in series with equivalent components.

Instead of placing several rectifier discs in series to obtain high voltages,



D-C characteristics of typical metallic rectifiers on one square centimeter of active area



BACK VIEW of a G-E germanium rectifier unit, showing wind switch-fan and transformers.

An order was placed for four (nominal 25-kw. size) packaged power supplies, each connected to provide 225 amps at 130 volts. Total output of the four units does not quite equal the retired MG set.

Load character

In common with most electrolytical processes, the load is constant and the internal circuit resistance is quite low. It follows that initial applied voltage should be low enough to limit inrush current to a reasonable value. A safe value for use with the rectifier is an initial voltage in the order of 25%. As this value of voltages applies, the current begins to flow through the electrolyte, which produces a back EMF (electromotive force).

As this countervoltage rapidly rises to a value almost equal to applied voltage, the inrush current is reduced to practically zero. Once the countervoltage is established, it is possible to increase the applied voltage in rather large steps without encountering undue inrush. For best results, the circuit should not be interrupted when increasing the applied voltage. If a series reactor is used in the AC current supply to limit the initial voltage, the simplest way to increase the applied voltage is to by-pass the reactor through a contactor.

it is customary to connect one complete unit in series with another. Since a 25-kw. package DC power supply is a standard industry rating, it is convenient to use a transformer with two secondary windings, each supplying a double-way circuit consisting of six rectifier cells. These two double-way circuits can then be connected in parallel to provide 450 amps at 65 volts, or they can be connected in series to provide 225 amps at 130 volts.

In either case, an output rating in excess of the nominal 25 kw. is provided. Such equipment is offered in a complete self-contained package.

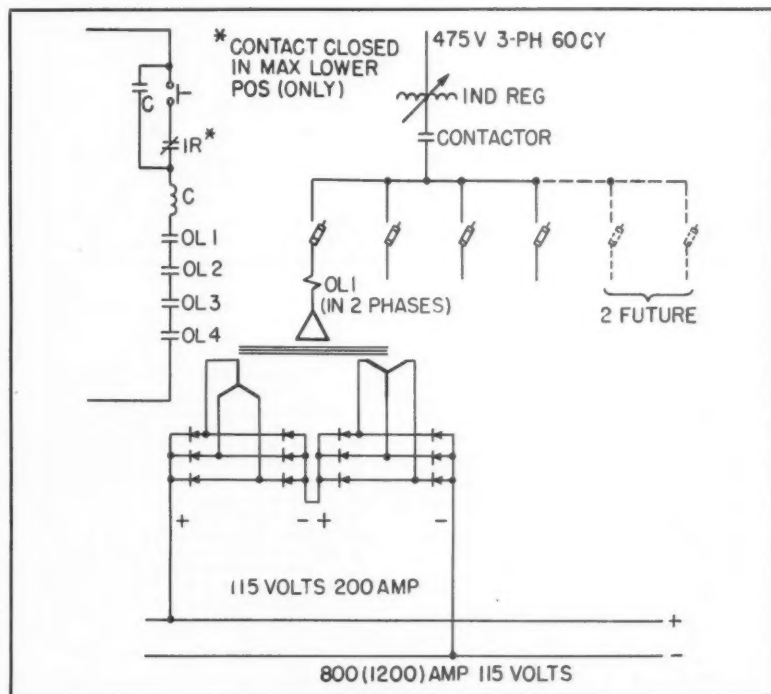
To summarize, the principal advantages of germanium power rectifiers over other metallic disc types are:

1. High efficiency
2. Low regulation
3. Good stability
4. Very small reverse current
5. High inverse voltage rating
6. Small physical size

Industrial application

By early 1953 research had established that germanium power rectifiers were sufficiently reliable to be put to work for industry. The Metal & Thermit Corp. became the first to operate G-E germanium power rectifier equipment early in 1954. Metal & Thermit is engaged in reclaiming tin from tin plate scrap by the electrolytic method, which requires a considerable amount of direct current at a potential in the order of 115 volts. Direct current for this operation had previously been supplied by an MG set of 1,200 amps rating.

When it came time to retire the old MG set, the company began to make comparisons of the different types of DC power supply. The germanium unit was comparable in price to other metallic disc rectifiers of comparable rating and was also competitive when the relative installation costs were included. Further, there was the prospect of a bonus in the form of approximately 10% higher efficiency than other types of power supply.



THIS D-C power supply for reclaiming tin can be connected either in series or parallel.

Applied voltage can safely be changed from an initial value of 25% to an intermediate value of 75% in one step. The countervoltage continues to rise as the applied voltage is increased until it finally reaches a maximum of about 80% for final pull load voltage. Beyond this point applied voltage merely overcomes internal load circuit resistance as the current is increased.

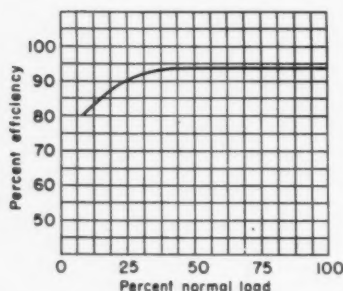
Since the load is not subject to rapid changes once the steady state current is established, a manual voltage adjustment is completely satisfactory. An induction voltage regulator is used to provide stepless adjustment of the applied voltage from 75% to 120% of the required full load voltage. This regulator is manually adjusted, there being no need for automatic voltage regulation.

This load may remain continuous for a week or more at a time, requiring only a minor adjustment to the regulator now and then to keep the current constant. Any increase in continuous load current will require an increased applied voltage sufficient to overcome the additional internal drop in the load circuit. Chemical and physical characteristics of the load limit the maximum practical current that can be used.

The induction voltage regulator has suitable capacity for six rectifier units and provides a range between 74 volts minimum and 122 volts maximum DC output at the rectifier terminals.

Prospective applications

Although this Western installation is the first, General Electric's orders indicate growing popularity of this new development. At present, total capacity of equipment now on order and being manufactured is in excess of 200,000 amps, which corresponds to approximately 8,000 kw.



Germanium efficiency

Examples of germanium applications are:

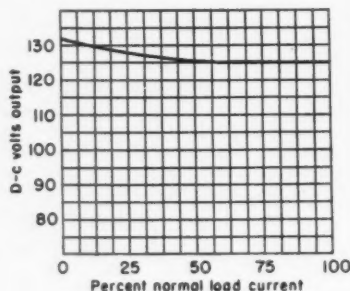
1. 40,000 amps at 24 volts for aluminum anodizing.
2. 4,000 and 8,000 amps at 80 volts for titanium sponge reduction.
3. 32,000 amps at 65 volts for hydrogen cell line production.
4. 45,000 amps at 12 volts for plating.

There is also interest in possible application to copper refining, magnesium dioxide and lithium chloride production, steel mill tinning lines, and aluminum re-refining.

The price of germanium power rectifiers is generally competitive with selenium; however, there are some variations depending on the size unit selected since manufacturing costs vary greatly for different ratings. A rather considerable difference in first costs between germanium and selenium can be written off in a very short time by the operating cost savings due to relatively greater efficiency of germanium. Laboratory tests, run for extended periods, indicate that the life of germanium rectifiers is likely to be much longer than for selenium rectifiers without the objectionable aging feature that decreases the output of selenium.

Air-cooled types of germanium rectifiers are adequately protected from moisture by a plastic coating, except in areas where humidity is excessive. There is no problem of moisture deterioration with the liquid cooled type, and this will probably have considerable bearing on future equipment orders. Although, the most attractive field of application for germanium power rectifiers so far has been electrochemical, there are experimental applications where the load is fluctuating such as in DC motors.

This article is in part based on a speech given by the author before the American Institute of Electrical Engineers in Los Angeles.



Germanium regulation

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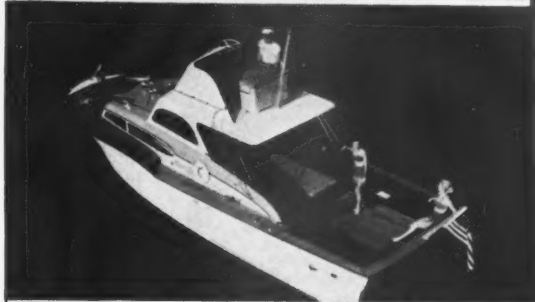
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Bending a Revere Copper Tube for use in a Chris-Craft Cruiser. Revere Tube is also used in many Chris-Craft runabouts and utilities.

How small plant managers can take off the handcuffs

Part 4 of an industrial management survey

By
LOUIS E. DAVIS
Industrial Engineering
and
EARL E. R. JONES
Engineering Extension
University of California
Berkeley

ORGANIZATIONAL methods for small plants that will enable them to exercise foresight, rather than merely hindsight, are a crying need, this installment indicates.

Lack of adequate control practices results in post-mortems, and prevents getting a clear picture of developments as they occur and taking corrective action immediately, it is pointed out.

Absence of clearly defined procedures and concentration of functions in the hands of one, or at best a few individuals, necessitates inordinate attention by the manager to unimportant details and leads to failure to execute some functions and inadequate discharge and underemphasis of others.

Controls are management tools or methods for assuring accountability. The mechanism of control embodies operating and budgetary reports which permit the comparison of accomplishment with plans, so that immediate action can be taken to correct variances. This permits the use of the exception principle of management.

Well developed controls bring the manager closer to all operations. They sharpen management sensitivity in regard to unrealistic or outmoded plans and to poor performance. Properly functioning controls provide a clear picture to management as developments occur, rather than accounting for discrepancies after it is too late for corrective action. Controls permit plans to be dynamic.

Variances reported permit attention to be focused upon the need for alterations in plans, or operations, or both. It has been indicated previously that the functions of management are

to plan, organize, and control. When management fails to exercise adequately any of these functions, it can properly be said that it is not managing.

The findings of the survey indicate that one of the notable characteristics of all of the companies is a lack of adequate control practices which we have come to associate with well operated production organizations. It might be said that the concept of control as discussed above is missing.

Real analyses rare

Cost analysis, budget analysis, analysis of production in terms of fluctuations in volume, analysis of labor costs, etc., are seldom undertaken. Where such analyses are undertaken, they are generally a post-mortem review of the previous year's activities; thus the causes of variations which might be uncovered can no longer be rectified. In most cases relatively simple and not very effective attempts are made to control such major direct costs as those of labor and materials.

Such controls as are used are based entirely on historical standards of performance, which in themselves fail to provide very sharp means for control. Only the largest of the organizations carries out any control of its sales activity.

Each of the firms in the survey was

asked to enumerate the principal problems which it faces in the conduct of its business. With a few exceptions, the managers reported that they had few, if any, unsolved problems of major consequence.

In the opinion of the authors, a major source of the small manufacturers' difficulties are pinpointed in this single statement. Perhaps this is another case of being too close to problems to identify them. A review of the previous articles, which were devoted to a detailed analysis of planning and operating methods, will indicate that many serious problems do confront the small manufacturing firm.

The major problems that were reported are as follows, in order of decreasing frequency:

1. The need for adequate control techniques applicable to manufacturing and sales.
2. Additional sources of operating capital.
3. Relief from what is felt to be an inequitable tax structure.
4. Developing methods of attracting and retaining an adequate labor force.
5. Cost reduction.
6. Developing supervisory abilities.
7. Improving company-wide sales and manufacturing organization structures.
8. Strengthening of planning and scheduling functions.

Previous installments

September:

HOW BIG AND SMALL COMPANIES DIFFER

October:

PLANNING FUNCTIONS IN THE SMALL PLANT AND METHODS FOR CARRYING THEM OUT

November:

WHO EXERCISES THE CONTROL FUNCTIONS IN SMALL PLANTS?

Next installment

SMALL COMPANY POTENTIAL, AND HOW TO REALIZE IT

Evaluation

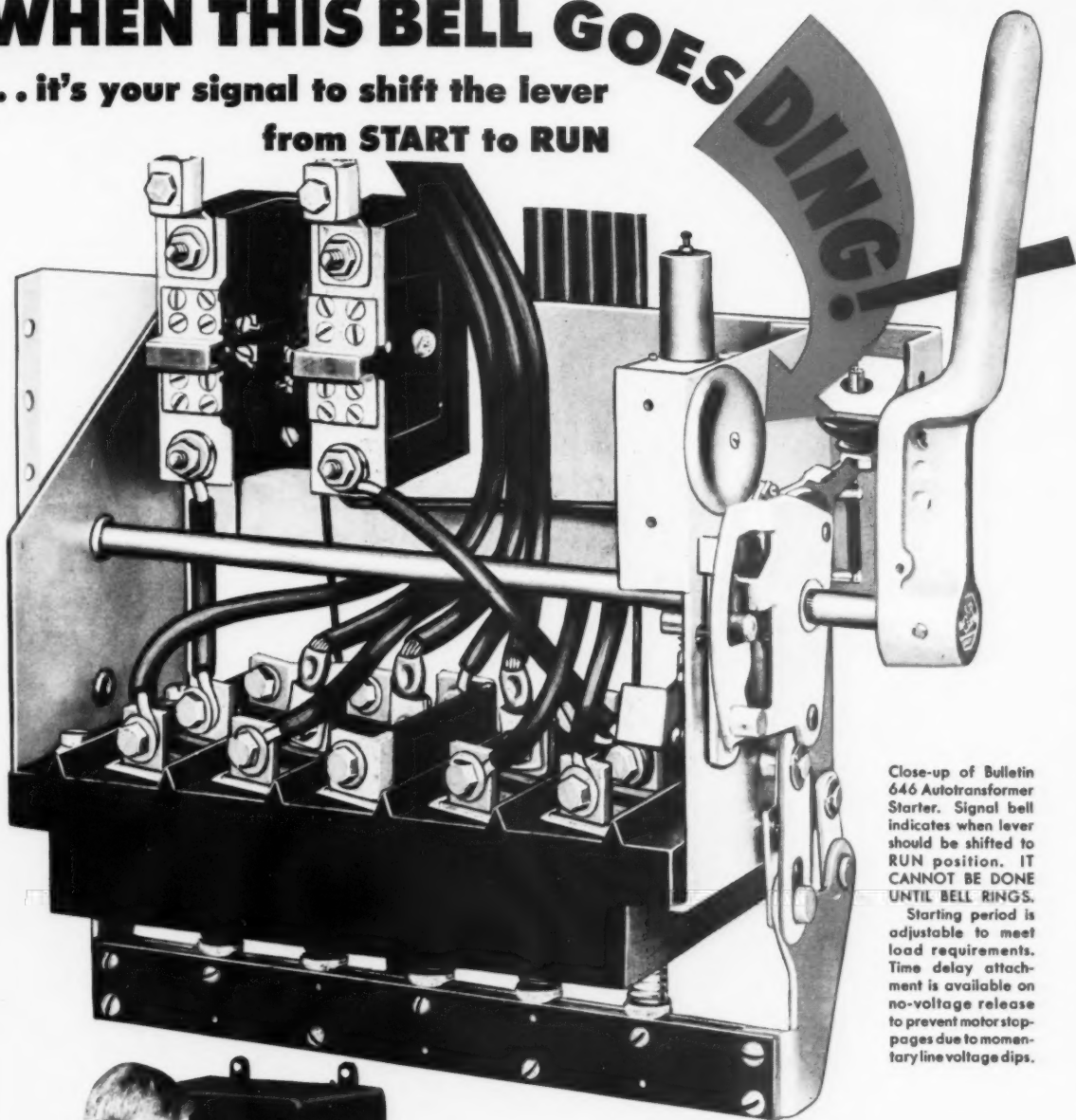
Before proceeding with an evaluation of the findings of the survey, it may be well to evaluate briefly the methodology of this study, so that some limitations can be noted.

It hardly needs repeating that the findings are based on a small sample of manufacturing firms having up to 100 employees. Further, the findings reported are taken from information gathered in interviews, and the authors have had no opportunity to verify the information.

... Please turn to page 45.

WHEN THIS BELL GOES

... it's your signal to shift the lever
from START to RUN



Close-up of Bulletin 646 Autotransformer Starter. Signal bell indicates when lever should be shifted to RUN position. IT CANNOT BE DONE UNTIL BELL RINGS.

Starting period is adjustable to meet load requirements. Time delay attachment is available on no-voltage release to prevent motor stoppages due to momentary line voltage dips.

Air-break Contacts up to 75 HP, 220 V; 150 HP, 440-550 V

The outstanding feature of the Allen-Bradley Bulletin 646 Autotransformer Starter—in Sizes A, B, & C—is the use of silver alloy, air-break contacts. They do away with oil tanks and messy contact maintenance. Only the Size D starter—rated up to 250 hp, 440-550 v—requires oil-immersed contacts.

Send for Bulletin 646 giving complete details on this popular line of reduced voltage squirrel cage motor starters.

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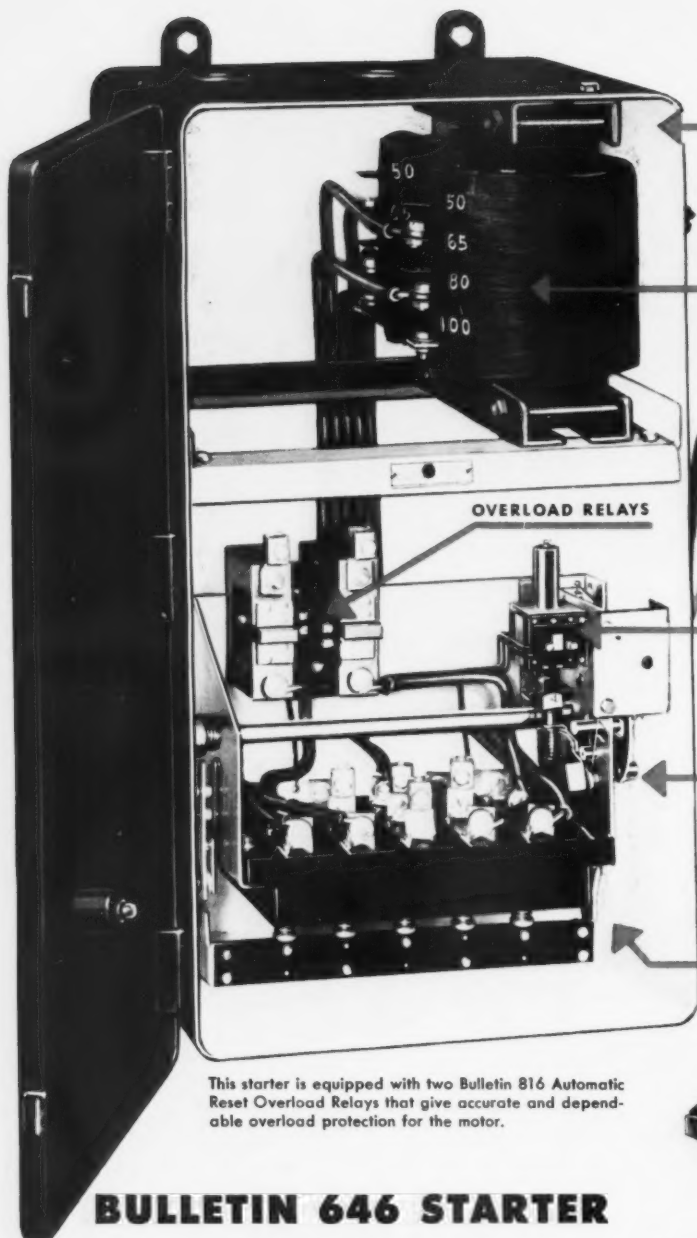
Operator listening for signal bell which indicates when to throw lever into RUN position.



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BULLETIN 646 AUTOTRANSFORMER STARTER

QUALITY



ENCLOSURES WITH WHITE INTERIORS

White enameled inside walls of the starter cabinet reflect light on the switch mechanism, making installation and inspection easy even in dark plant locations.

THREE-PHASE AUTOTRANSFORMER

The double winding, open-Delta-connected 3-phase autotransformer has 50%, 65%, and 80% reduced voltage taps. Starting voltage can be easily adjusted to suit the load.

MANUAL OPERATING LEVER

The operating lever is mechanically interlocked with a simple latch which forces the operator to pull the lever into the START position before throwing it into RUN position.

MAGNETIC HOLD-IN LATCH

Contacts are held in the RUN position by a solenoid-operated latch which drops out in case of voltage failure and opens the starter contacts. Operator must restart the motor.

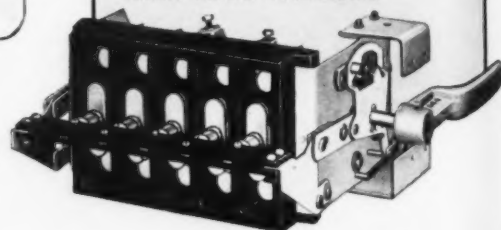
TIME DELAY SWITCHOVER

An adjustable vacuum cup can be set for any starting period from 0 to 15 seconds. Hand lever cannot be pushed into RUN position until the preset starting interval has elapsed.

DOUBLE BREAK, SILVER ALLOY CONTACTS

Here are shown the movable contact bar and the stationary contact block. The double break, silver alloy contacts have long, maintenance free life. No oil needed.

This starter is equipped with two Bulletin 816 Automatic Reset Overload Relays that give accurate and dependable overload protection for the motor.



BULLETIN 646 STARTER

HAS AIR-BREAK CONTACTS up to 75 HP, 220 V; 150 HP, 440-550 V

GOOD NEWS . . . Bulletin 646 Autotransformer Starters are available with AIR-BREAK contacts in ratings up to 75 hp, 220 v; and 150 hp, 440-550 v. Only Size D starters require oil-immersed contacts for motors up to 250 hp. The oil-immersed construction can be supplied, however, in Sizes A, B, and C, but their use should be limited to the types of installations which require oil-immersed contacts.

The extraordinary advantage of air-break contacts accounts for the booming popularity of the Sizes A, B, and C starters in the Bulletin 646 line. The silver alloy contacts remain in good condition without filing, cleaning, or dressing. Send for Bulletin 646, which gives all the facts about these remarkable starters. They are the only modern starters of this type on the market.

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BULLETIN 646 AUTOTRANSFORMER STARTER



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To secure the cooperation of small plant managers, limitations had to be imposed on securing information concerning financial status, worth, and cost comparisons between companies. As a consequence it is impossible to indicate what effect certain management methods have had or will have on a company's competitive position, financial status, growth, and profit margin.

Organization

The simple line type of organization, dominated by one or a few individuals, is characteristic of the companies studied. As a result the company develops according to the predilections of its chief operating officer. It is strong in those areas where his skills and interests are strongest.

For the companies in this study, this has led to organizations strong in production, having a moderate development of the sales function, and little development of planning, control, and training.

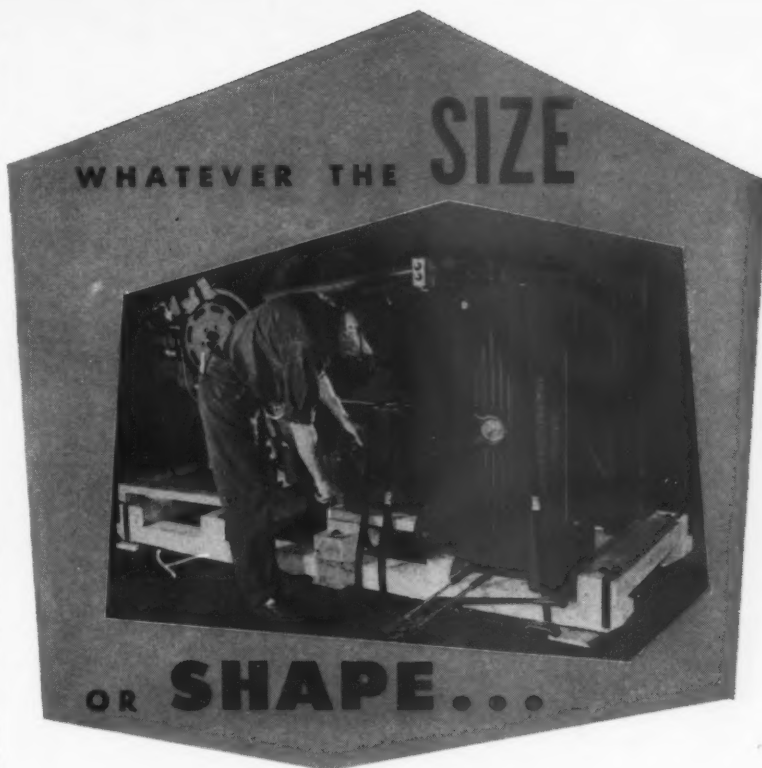
Functions are grouped around the men available, rather than being organized to suit the needs of the company. This has led to a concentration of functions in the hands of one, or at best a few individuals. Concentration leads to failure to execute some functions, inadequate discharge of some, and underemphasis of some.

Part of the difficulty lies in the failure to identify functions as the practices of recognized management specialties. Such identification would help the development of proficiency coming from a study of the literature and association with the specialist groups such as accountants, industrial engineers, personnel managers, etc.

Only the few largest companies have staff assistants to aid the managers. The assistance usually found, such as tax and general accountants, is employed because of legal requirements.

Organization descriptions, in the form of manuals or charts, are clearly outside the realm of practice of the companies surveyed. Without the specification of functions comes some overlap as well as omission of duties and the failure to delegate authority and responsibility. As a consequence, adequate control systems are not established and the exception principle of management cannot operate.

A key to good organization is the adequacy of communication. No clearly defined channels of communication were found in the great majority of the companies studied. It may not be necessary, and in fact may be beneficial, that the small company does not rely upon formal channels of communication.



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Lack of formal channels, however, places a very heavy burden on those at the top who are the recipients of all information. As may be estimated from the above, few clearly defined procedures were found in use, thus necessitating inordinate attention by the manager to unimportant details. Top management is concerned with and devotes considerable time to making inconsequential decisions.

As may be expected, the concentration of functions and the failure of organization planning to provide descriptions of duties, functions, and responsibilities results in management's being spread very thin. There is no depth in any management position because little action is taken to prepare individuals to move up in the organization so as to provide replacements. No provisions have been made for the development and growth of leaders in the organization.

Functions and methods

The detailed analysis of planning, operating, and control functions presented in previous articles indicates weaknesses in the definition and execution of many of the specific activities which are characteristic of a well managed plant.

It is true that, individually, most of the functions discussed assume a secondary role in the smoothly running small firm and may be delegated to the second or even the third level of management. However, failure to recognize their importance and properly provide for their execution elevates each function to the level where only executive decision can resolve myriad semi-routine matters which arise daily.

Planning

As indicated in Part 2 of this series, well over one half of the companies surveyed engage in planning. They forecast sales and establish both production plans (long range) and schedules (short range). An analysis of the data presented indicates that the planning period is usually 3-12 months and is most frequently reviewed at intervals of 1-4 weeks. The maximum scheduling period is one week but the most frequently used period is one day.

From this it would appear that the long range sales forecasts and production plans are not fully utilized as guides for scheduling and controlling production and sales. The typical manager admits that the long term view is important, and he formalizes planning for it. However, he is not sufficiently certain of his estimates to rely on the very data that he has developed.



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FORMEX* WIRE stator windings won't break down, will resist solvents, moisture and heat. Wire is bonded by Glyptal* varnish to help protect against full-voltage starting stress.

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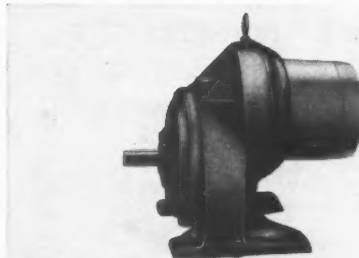
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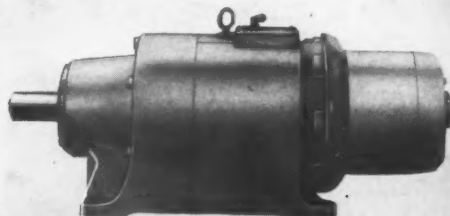


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Consequently, the goal of long-range planning, which is the establishment of a uniform production rate, does not materialize. In actuality, many of the companies are producing on a week-to-week or even on a day-to-day basis. It may be inferred that, despite planning, production is frequently scheduled upon the receipt of orders. Service and job shops, of course, cannot proceed without the receipt of orders.

Usually notable by their absence are the planning activities normally associated with modern production management practice. The planning of process, methods, and product design for low cost production, and the establishment of standards of performance are not generally developed.

With few exceptions, no planning is undertaken of budgets for the control of labor, materials, equipment, etc. Where budgets are developed, they are not vigorously carried out.

Planning functions are discharged largely through the use of informal methods, which may be desirable for the small company. Close association with all aspects of company operation may make informal methods effective. On the other hand, completely informal methods may be detrimental to good operation because they rely upon word of mouth communication and provide neither for automatic follow-up nor a record of prior practices.

Operations

The lack of formal planning reported above, together with the failure to vigorously carry out such plans as are made, has a serious effect upon the conduct of manufacturing operations. It is quite possible, albeit inefficient, to operate a production facility without benefit of long range planning. Although this may be considered by some as a blessing of the small enterprise, it results in a continued demand for high level decisions on matters which might otherwise be handled in routine fashion.

Characteristic of the little business is its remarkable flexibility. This constitutes a material advantage with respect to the abilities of the larger competitors and in fact is the life blood of the small firm. The possession of this flexibility does not preclude the need for systematizing operating methods, so as to minimize operating costs and provide management with more time for managing.

In the pursuit of minimum costs, the small company has several factors in its favor. The close personal relationships which characterize these firms can engender a degree of employee loyalty and motivation which is

the envy of larger businesses. The flexibility enjoyed permits acceptance of a greater variety of work and of order sizes which would be uneconomical for others. With these advantages as a starting point, the successful small plant must assure itself that full advantage is being taken of other avenues leading toward low cost production.

The lessons learned in the development of industrial engineering practice point to the necessity of establishing and maintaining effective yardsticks of operation. Maximum economy of operation requires not only that methods and costs be standardized, but also that these be kept current through constant refinement.

Of prime importance are such items as: the standardization of parts and materials; the selection and design of tools and equipment; development of performance standards and wage payment plans; the layout of facilities; the determination of production methods and equipment selection criteria; recruitment, selection, and training of personnel; and the control of materials, tool, and quality.

Attempts are made to solve the many problems arising from failure to discharge properly these activities. Since industrial engineering methodology is almost unknown among the smaller manufacturers studied, it is not surprising that their attempts depend principally upon rules of thumb rather than reasoned evaluations of their own experience and that of others.

Controls

It would be somewhat of a surprise to find extensive controls in use in companies doing limited planning and using elementary operating practices. One of the notable characteristics of all the companies in the survey is the low use made of controls.

This represents one of the critical areas of deficiency in small company management. The lack of well designed controls makes it easy to persist in activities that should be discontinued or to repeat errors previously made.

Failure to use controls, in effect, cuts down on the sensitivity of management to its operations. Variations and causes of variation usually are not uncovered until it is too late to take effective action. Perhaps more important, the lack of controls make it difficult for management to learn from its own experience.

The last article in the series will be devoted to a discussion of the potential of the small company and recommendations for the fullest realization of that potential.

Pace-Setting HD-5G Tractor Shovel

NOW BETTER 3 WAYS

FOR EFFICIENT MATERIAL HANDLING



HD-5G TRACTOR SHOVEL

Rated capacity	1 1/4 cu yd
Belt horsepower	50
Weight, complete	16,200 lb
Dumping height	9 ft, 2 in.

From the time of its introduction seven years ago, the Allis-Chalmers HD-5G Tractor Shovel has been tops in popularity. Many thousands are daily proving their ability and versatility on all kinds of material handling and excavating jobs.

Now, design refinements make the HD-5G a three-way better value than ever before:

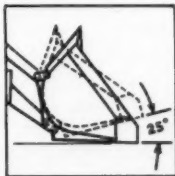
1. Has Bigger Rated Capacity

New bucket handles a big 1 1/4-yd load — streamlined design now helps roll in large loads with less tractor effort. The back of the bucket has been brought forward and the sides extended to cut spillage, put more payload where it's wanted.

2. Helps the Operator Do More

Cleaner dumping with the new bucket saves the operator time and effort shaking out loads.

For added versatility, there is a two-position bucket available with both standard automatic return to digging position and operator-controlled tip-back. If the operator chooses to use the controlled tip-back, he can load the bucket, then tip it back approximately 25° before raising, assuring maximum output under special conditions such as downhill loading or loading loose materials.

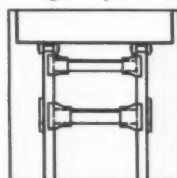


The HD-5G helps the operator do more in other ways, too — giving him full vision, fast and easy control, cleaner platform and more comfortable seat from

which to work, and more working time with truck wheels, support rollers and idlers that need greasing only once every 1,000 hours.

3. Works at Lower Cost

The HD-5G now works at even lower cost than ever before — not just because it *does more*, but because it has features that mean *less maintenance, longer life*. For instance, new type tubular bracing on the bucket booms provides added strength and support, keeps the bucket in line. The floor at the rear of the new bucket has been raised seven degrees to reduce wear on the bottom sheet. Heavy-duty truck wheels and idlers are available for particularly tough working conditions. One-piece, full-length main frame permits unit construction so that major assemblies can be removed without disturbing adjacent units, putting tractor back on the job in hours rather than days.



Ten Quick-Change Attachments Add to HD-5G Versatility

Bulldozer	Crane Hook	Tine Fork
Angledozer	Light Material Bucket	Rock Fork
Narrow Bucket	Trench Hoe	— also rear-mounted Ripper
Rock Bucket	Lift Fork	

See your Allis-Chalmers dealer for more about these and other production-boosting features of the popular HD-5G Tractor Shovel.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.



QUALITY CONTROL inspector at Rheem Manufacturing Co., Richmond, Calif., records two important dimensions of a copper rotating band (part of a 155 mm. shell) on an \bar{X} and R chart. Failure to meet tolerances in machining the band necessitates cutting it off and replacing it, an expensive operation.

What the West needs in order to compete

Cost accounting and process control are the keys to national contracts

By
CLIFFORD ROHLF
Chief, Ammunition Inspection Branch
San Francisco Ordnance District
Oakland, Calif.

ALTHOUGH the industrial West has a real disadvantage in location as far as its ability to compete nationally is concerned, this doesn't mean it couldn't improve its position greatly by furiously sharpening a few pencils and finding the true cost of its manufacturing.

Whether or not a process and product are competitive is not determined merely by inherent conditions, but also by the operation's ability to overcome these conditions through manufacturing efficiency and economic stability.

Any consideration of inherent competitive disadvantages should point out that there are two significant features about the military procurement program not always apparent:

1. Sales costs are not included in bid prices.
2. Product design and acceptable quality levels are controlled by the consumer.

These features indicate that, exclusive of locational or other inherent disadvantages, competition is based primarily on unit costs developed through manufacturing experience.

Contract bidding

Most bids on military products are not prepared from data developed through actual experience of manufacturing the product, but rather from knowledge of the capabilities of equipment and the organization's experience used to produce maximum economy and maintain stability through the use of controls. This is a key factor in the preparation of bids.

Without actual manufacturing experience on a given product, it is necessary to rely on such factual cost data as are available. This data can be easily adjusted to fit the circumstances. Without this factual cost data, any assumption made may result in the inclusion of large safety factors, hampering the firm's bid competitive capacity.

Factual cost data can be developed through a standard unit cost accounting system in conjunction with an or-

ganized process quality control program. These are the principle management tools required to develop the economy, maintain stability, and supply the factual cost data necessary for contract bidding and overall operational planning.

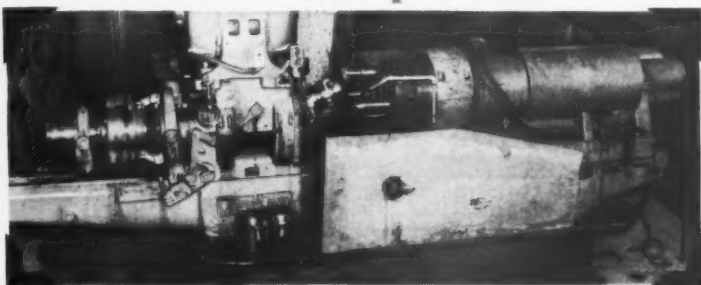
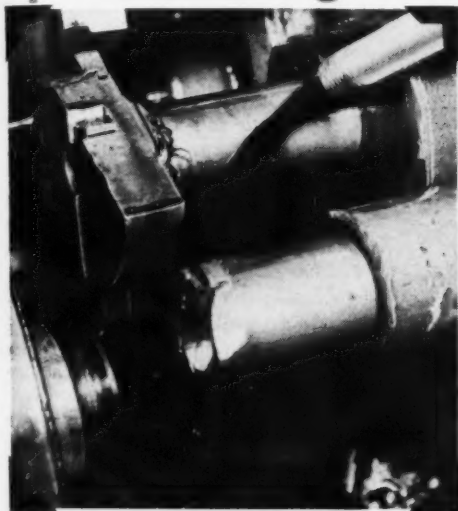
A unit cost that reflects maximum economy and maintains stability through an organized process control program is the most important data that industry can develop. It helps take the guesswork out of contract bidding and overall operational planning and allows for easy conversion from the manufacture of one product to another—often the case in military procurement.

Conversion from the manufacture of one product to another is not always easy. For example, when a manufacturer has been producing a product of his own design and has maintained control of the outgoing quality and then attempts to manufacture a product where the product design and outgoing quality are controlled by the consumer, he finds himself in another manufacturing world from the standpoint of controls. The two types of

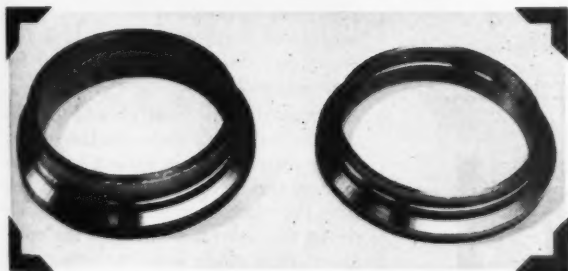
STANDARD ENGINEER'S REPORT

DATA	
LUBRICANT	Calol Cutting Oil 39-DA
UNIT	Automatic screw machines 1/2" to 5 1/4"
LUBRICATOR	Circulating
SERVICE	Machining spun cast stainless steel
FIRM	Speedway Engineering Co., Montebello, Calif.

Special cutting oil boosts tool life, improves finish!



WHEN CALOL CUTTING OIL 39-DA replaced a competitive oil on this 4 1/2-inch Cleveland Automatic Screw Machine, it greatly increased tool life, improved the finish, and produced the close tolerances required in machining spun cast stainless steel. Tool life on this machine now averages 8 hours. The aircraft flange being worked at left, requires a 100 micro-inch finish and a final tolerance of 0.0015 inch. The Speedway Engineering Company has found Calol Cutting Oils completely uniform and able to handle efficiently any work in their shop.



THE HIGH FINISH OBTAINED with Calol Cutting Oil 39-DA is shown in this comparison photograph. The spun cast stainless steel flange (left) has been rough cut, while the other (right) has had final machining. This shop also uses Calol Cutting Oils on engine and turret lathes, milling machines, and drill presses.



FREE CATALOG: "How to Save Money on Equipment Operation," a handy booklet full of valuable information, is ready for you. Write or ask for your free copy today.

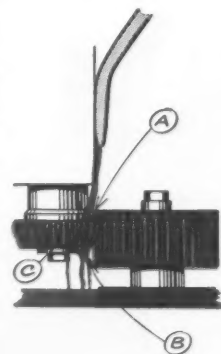


TRADEMARK "CALOL" REG. U.S. PAT. OFF.

How to increase efficiency in all metal-cutting operations

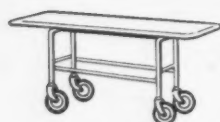
Use the correct Calol Cutting Fluid for any operation from grinding to broaching. Recommendations for each are made from actual working results.

- Have high cooling and lubricating qualities—minimize "built-up edge" and promote good finish.
- Flush away cuttings readily.
- Protect machine and work against rusting and corrosion.



STANDARD TECHNICAL SERVICE checked this product performance. For expert help on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative; or write Standard Oil Company of California, 225 Bush St., San Francisco.

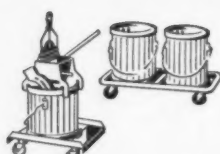
STANDARD OIL COMPANY OF CALIFORNIA



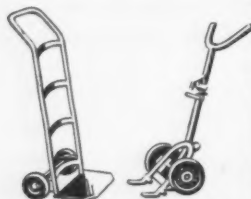
WHEEL STRETCHER
& HOSPITAL EQUIPMENT



DISH TRUCK



MOP TRUCKS



HAND TRUCK DRUM TRUCK



FOR GENERAL USE



FURNITURE TRUCK

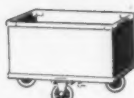


KEG TRUCK

TRUCK Selection Chart



CANVAS BAG TRUCK



TANK TRUCK



PLATFORM TRUCKS



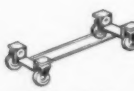
BOX OR CRATE
DOLLY



MILK CRATE
DOLLY



REFUSE CAN
DOLLY



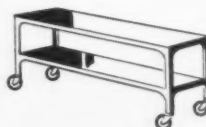
PIANO DOLLY



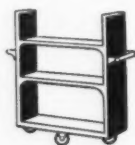
FURNITURE DOLLIES



LINEN SERVICE TRUCK



MARKING TABLES



SHELF STOCK TRUCK

**COLSON
TRUCKS**

Colson Equipment & Supply Co.

LOS ANGELES 13

1317 Willow Street, TRinity 5743

OAKLAND 7

350 Tenth St., TEmplebar 2-3556

SAN FRANCISCO 5

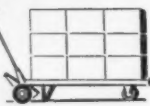
20 Beale Street, GAfield 1-0280



"LIFT JACK" MATERIAL HANDLING SYSTEM



LOAD 'EM UP, JACK 'EM UP AND ROLL



STACK 'EM UP

manufacturing can be so completely different from the control standpoint that often an outstandingly successful manufacturer in one field will be a complete failure in another.

The problems involved in contract bidding can be considerably minimized when factual cost data are available. No bid is competition proof. If, however, it reflects factual cost data representing the true capabilities of the equipment and organization to be used, it is more likely to be successful, more likely to produce a profit, and does not represent a large expense if it fails to produce results.

Standard unit costing

Standard unit cost is the backbone of overall operational planning when it reflects the true capabilities of the equipment and organization and is kept accurate and constant through an organized process control program. The unit cost should always be developed along with an organized process control program so that it reflects the peak operating efficiency of the process and has assurance of stability.

Caution should be exercised in determining peak operating efficiency, because even an organized process control program can employ machine set-up and process inspection technique without taking full advantage of the design tolerance. This does not necessarily represent the true capabilities of the manufacturing process. It should be pointed out that the unit cost must be properly developed or its usefulness is severely reduced; in fact it can be dangerous when used for planning purposes.

Standard unit cost should not be determined from time studies alone. Time studies merely reflect what machines and people are doing at the time the study is made and do not indicate the true capabilities of the operation. Time study is an important part in the preparation of the standard unit cost but should include complete cycles of all conditions in the operations. Full advantage must be taken of design tolerance through a process control program.

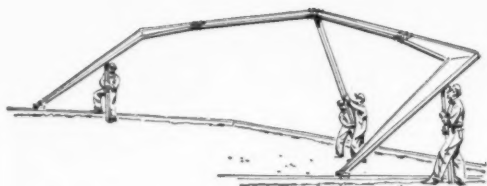
Costs developed without controls represent neither the true capabilities of the manufacturing process nor stability. These cost fluctuations can be the deciding factor in meeting competition. Using time studies without controls is a common mistake currently being made by many professional industrial engineers.

Process control

The primary objective of process control program is economy and sta-

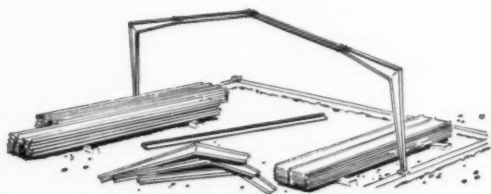
You can do all this with a

BUTLER steel building



Complete it in half the time—

Half-finished at the factory—with precision die-formed and punched cover panels—a Butler building goes up fast. It simply bolts together.



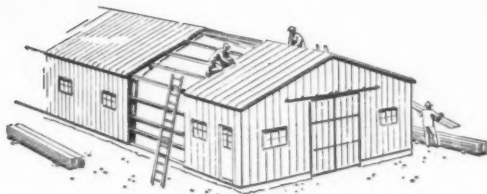
Move it quickly and conveniently—

Yes... move it, with 100% salvage of the original materials! Simply remove bolts, transport sections to new site, and re-assemble.



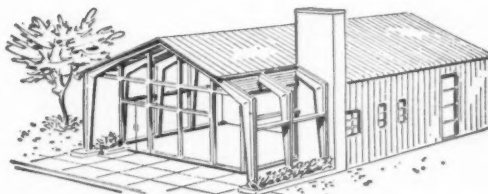
Modify it to any use—

Need an attractive store or dealership, loading dock, hoists or monorails? Your Butler dealer will plan and install what you need.



Expand it economically while in use—

Move out walls and bolt in new sections with less than half the usual delay and mess—and without loss of materials. Costs less too!



Finish it to any degree of beauty—

Your Butler dealer will build to meet the needs of your business—install decorations, masonry front, offices, interior finish, etc.



Use it in any climate—

Designed to seal tight—and precision made—a Butler building is storm-proof. Easily insulated against tropic or arctic weather.

...and buy it for **LESS** than a conventional building!

Yes, Butler's modern engineering and mass production have created a modern building that saves you money right down the line—on erection,

materials and maintenance costs. Investigate Butler before you buy. Why not start now by mailing coupon below for free catalog.



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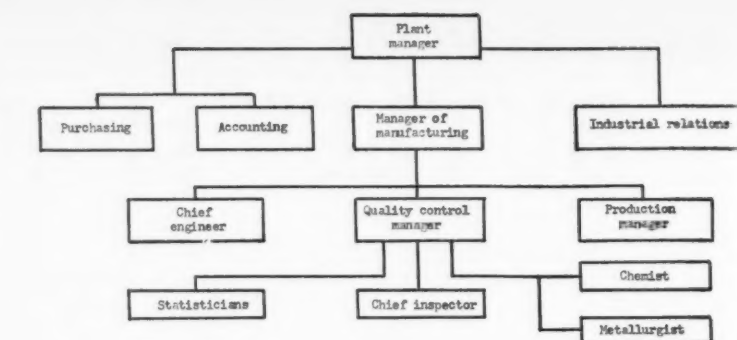
bility. It is an organized program of management control designed to manufacture a quality product through the development of maximum operational efficiency and also to maintain that efficiency economically and consistently. Actually, it is a program of getting maximum economy from a manufacturing process and maintaining economic stability through organized controls.

Nothing in a manufacturing process is so stable that it does not require some sort of control. Machines, people, material, tools, gages, all produce a certain amount of variation in quality which must be economically identified, reduced, and controlled. Economy is the prime factor, and control efforts are applied accordingly. Consequently, the degree of application will vary considerably between manufacturing processes.

Process control

A process control program should be developed in five major steps:

1. Establishment of a proper organization.
2. Assignment of responsibilities in writing.
3. Identification of manufacturing variation.



THIS plant organization chart typifies a successful operation in which the consumer controls both product design and the general quality levels of the resulting product.

4. Reduction of manufacturing variation.

5. Control of manufacturing variation.

The first major step in developing a process control program is to establish an organization capable of accomplishing the mission. This organization should be tailor-made to do a specific job, and in no case should the job merely be fitted into the organization.

Each manufacturing mission has its

own individual characteristics that require organizational consideration. The right organization is so important that it often affects the successful accomplishment of the mission.

Every decision to control quality requires an analysis from an over-all operational standpoint. When product design and outgoing quality are controlled by the consumer, there is a constant job of analyzing data requiring full time consideration of every manufacturing detail.

Getting maximum economy from a manufacturing process requires constant coordination of the activities of the production, engineering, and quality control departments. In most cases these operating departments do not have the time or the trained personnel to gather the statistical data necessary for economic analysis, nor do they have time for proper coordination of quality information.

Gathering the data

A quality control manager should supervise the gathering and preparation of all quality data for economic analysis and should understand statistics from the standpoint of their application to manufacturing processes. He should be free from routine assignments so that he can devote all of his time to planning and coordination of quality data. He can release key personnel of operating departments from most of their statistical evaluation responsibilities for other important work.

A manager of manufacturing should have all quality data channeled into his office so he can make an overall economic analysis and coordinate action with all departments. He should establish a system of reports and should hold scheduled conferences to stimulate collective thinking. He should direct the action program to



with this WISCONSIN-POWERED UNIT!

This sturdy unit takes a six-foot-wide bite in any kind of snow, loading from 7 to 12 cubic yards of snow per minute in trucks or throwing it clear. Builder is Krause Industries, Baraboo, Wisconsin and the snow blower is constructed to mount easily and quickly on the Hough Payloader Tractor-Shovel. A Wisconsin Heavy-Duty Air-Cooled Engine provides the power. Equipment builders and buyers are choosing Wisconsin Engines over all other types in the 3 to 36 hp. range . . . as the most satisfactory and fool-proof power to fit both the job and the machine. You'll find a model and size available to fit every power requirement . . . 4-cycle single-cylinder, 2-cylinder and V-type 4-cylinder models, 3 to 36 hp. Write for Bulletin S-164.



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Do these 5 NEW ASCO SOLENOID VALVES meet a special need for you?

Five completely new solenoid valves were developed by ASCO during 1954. Smaller size, greater efficiency and longer reliable life fit these valves to specific industrial uses.

A NEW ASCO 2-WAY SOLENOID VALVE

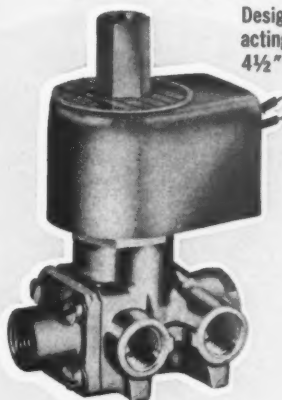


COMPACT: Only 2 3/4" face to face; 3 1/4" overall height.

Simple: Just two operating parts. Can be mounted in any position. Low power consumption. Standard, explosion proof or watertight solenoid enclosures. Normally open or normally closed.

BULLETIN 8210A

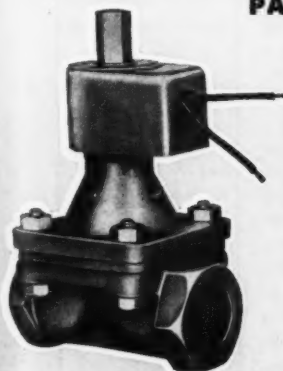
A NEW ASCO 4-WAY MIDGET SOLENOID VALVE



Designed for control of small double acting cylinders. Compact: Under 4 1/2" high, 2" wide, 2" deep with standard NEMA 1 solenoid enclosure. Operates up to 400 cycles per minute mounted in any position. Standard, explosion proof or watertight solenoid enclosures.

BULLETIN 8345

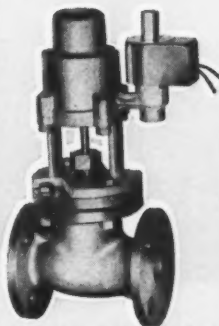
A NEW ASCO SOLENOID PILOT CONTROL VALVE WITH SAUNDERS PATENT TYPE BODY



Absolutely tight shut-off control for corrosive liquids and gases. The dependable ASCO pilot provides automatic control of main diaphragm valve using auxiliary pressure. Available normally open or normally closed in a wide selection of body materials. Standard, explosion proof or watertight solenoid enclosures.

SPECIAL BULLETIN 8336

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Two valves designed specifically for processing plants where corroding liquids or gases are handled. Many types of body materials available. Standard, explosion proof or watertight solenoid enclosures.

A NEW ASCO CORROSION RESISTANT 3-WAY SOLENOID VALVE



SPECIAL BULLETIN 8300

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minimize downtime when trouble exists, and guide the industrial relations program in departments under his jurisdiction. Finally, he should direct the application of the entire control program in writing so that it can be developed and used for training purposes.

Costs of maintaining a manager of manufacturing and quality control manager are incidental compared to the savings and stability they can develop. One of the greatest weaknesses of organizational planning is the lack of ability to determine the boundary lines of staff responsibilities. Every plant should have someone who is free from routine details and can devote the majority of his time to the overall planning.

Assignment of responsibility from staff personnel down through the janitor should be spelled out in writing in the form of a job description. This will do much to eliminate loopholes and overlapping, and the individual can do a better job of planning his operations. Job description should spell out the individual quality responsibilities in the process control program so that proper training can be planned and proper supervision executed.

Manufacturing variation

Every manufacturing operation consistently produces a certain amount of variation in quality characteristics that must be identified for systematic and economical application of control methods. This variation in a machine

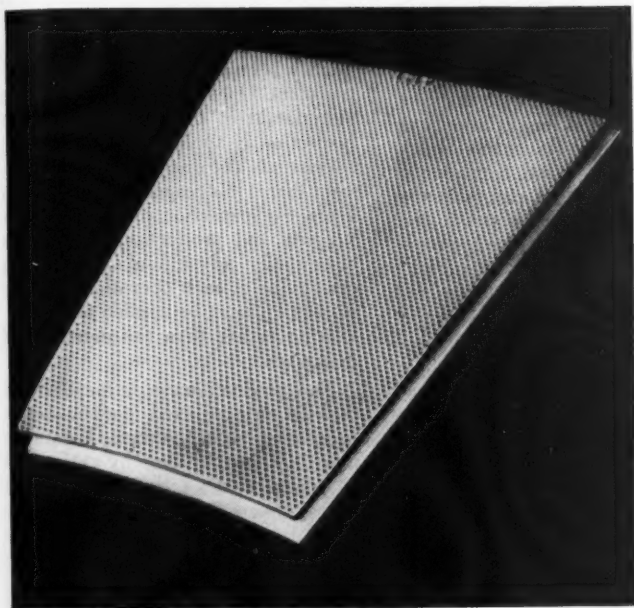
Dimension	Tally	Total
1.5100		
1.5095		
1.5090		
1.5085		
1.5080		
1.5075		
1.5070		2
1.5065	1	6
1.5060		13
1.5055		23
1.5050		34
1.5045		29
1.5040	1	13
1.5035		5
1.5030		2
1.5025		
1.5020		
1.5015		
1.5010		
1.5005		
1.5000		
Total		125

FREQUENCY distribution of 125 measurements from a machine producing a metal part. Data shows most parts fall between 1.5045 and 1.5055. None falls below 1.5030 or above 1.5070.

Now They Are Mass Produced

by HAYNES Investment Casting

Trade-Mark

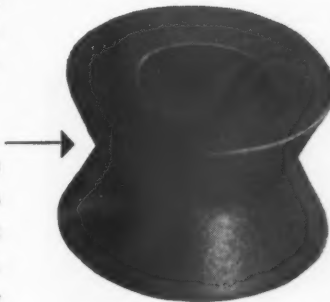


← **IMPROVED DESIGN AND MATERIAL**—The tiny needle-sharp points covering this plate must resist severe abrasion. Machined points used to wear out frequently because they were pyramidal in shape and highly susceptible to erosion. HAYNES investment casting made it possible to cast the points in a more stable conical shape from a hard, wear-resistant alloy. Life has been increased by 5 to 12 times.



EXCELLENT SURFACE QUALITY—For sanitary reasons, not even the smallest crevice can be tolerated on this cream separator part. Because of the high quality of HAYNES investment castings, it was found that the intricate part could be manufactured on a production basis with a minimum of imperfections showing up during the final polishing operations. This eliminated a great deal of wasted time, work, and metal.

NO MORE MACHINING—HAYNES investment casting eliminated the job of machining these rollers. Service conditions require that the rollers be made of a special alloy which is difficult to machine. They must resist rusting and the cutting action of wire passing over them under tension. The rollers give excellent service life and there are no more machining problems.



HAYNES investment castings can solve some of your own production and design problems. For more information, contact the nearest Haynes Stellite Company office listed below.

"Haynes" is a registered trade-mark of Union Carbide and Carbon Corporation.

HAYNES INVESTMENT CASTINGS

Trade-Mark

Sound, dense, high-strength parts available in cobalt-base alloys, nickel-base alloys, iron-base alloys, stainless steels, and alloy and carbon steels.

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is known as its normal or inherent capability to produce quality characteristics. It reflects such information as a machine's ability to produce a dimension on a metal part and consistently hold a tolerance of .002 in.

With knowledge of machine capabilities combined with normal tool wear, full advantage of the design tolerance can be taken, allowing maximum running time between adjustments and maximum economy in the machine set-up and process inspection control programs. Getting maximum machine running time is extremely important because it can actually increase production 30% or more.

The normal curve

These normal or inherent capabilities of machines to produce quality characteristics can best be determined by the use of the frequency distribution (the normal curve) and \bar{X} chart principles.

This information can determine the capabilities of a machine and also whether the conditions that produced them are normal. Detailed information covering the frequency distribution (normal curve) and \bar{X} chart principles can be found in several available quality control books.

Once the existing normal or inherent capabilities of each operation are known, an engineering analysis can be made of each machine to determine methods of reducing that variation. Machines can be modified, new chucks or bearings can be added that can reduce existing variation.

For example, it has been determined that a machine can consistently hold a tolerance of .004 in. while cutting a dimension on a metal part, and is assigned a job of producing a part with a tolerance of .006. An analysis of this machine might find that the majority of the .004 in. variation was in the chuck. Reworking this chuck would reduce the variation produced to .002 in. This change can be made economically and would increase the running time of this machine approximately 100% between adjustments, thereby increasing its productive capacity and causing a reduction in the machine set-up and process inspection costs.

Personnel variation is responsible for many manufacturing difficulties but can be reduced by training each person in his quality responsibilities. Most people do not make mistakes deliberately but because they are not properly informed. Personnel consistency is a product of the desire to do

good work and a knowledge of what is expected. An effective human relations program can assist in the reduction of personnel variation.

Control of variation

After the variation produced at each operation has been identified and reduced, we have the problem of controlling the remaining variation. It should be pointed out that the primary responsibility of manufacturing quality belongs in the production department. Once the product has been manufactured, no matter how much inspection is applied, the quality will not change. The quality control department shares this responsibility through a process inspection program and by keeping the production department continually advised of the existing conditions at each operation. Process inspection must be applied to the prevention rather than the detection of defectives.

The production department should develop an organized machine set-up program that will produce maximum machine running time by taking full advantage of the design tolerance and by minimizing machine set-up variation. Machine set-up charts should be prepared that include the inherent

*No need to hunt
for suppliers . . .*



The answer's in the YELLOW PAGES!



You don't have to hunt for smart suppliers. They're looking for you. That's why they make themselves a prominent part of the "Classified" section of your telephone directory. In addition to their product or service, they list their name, address and telephone number in the Yellow Pages because that's where 9 out of 10 people turn for information on folks who sell or serve.

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This simple trolley can Increase your working space 50%

... lifts parts and assemblies overhead

WHEN AISLES ARE FULL of parts, assemblies, stock boxes and trucks and there's no room for expansion, don't move to new quarters. Let these little trolleys lift the parts and assemblies overhead and make new working space. With more space and automatic delivery of parts your workers become more productive and manufacturing costs are reduced. Webb trolleys can deliver parts, hold them for assembly, and then, carry them high and away to the next operation. Costly handling and re-handling, sorting and stacking, loading and unloading are reduced.

These lightweight Webb trolleys have the same high quality features of larger Webb conveyors, including: I-beam track, forged chain, either roller or traction wheel turns, and either sprocket or caterpillar type drives.

Investigate cost reducing, space saving light-weight Webb conveyors; write for new booklet entitled, "10 Things Hired Hands Can't Do."



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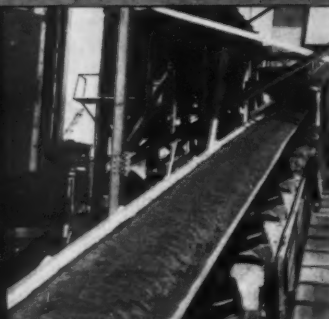
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"SUPER TRIPLE-S"—Goodall's finest Bulk Conveyor Belting . . . with a long-established reputation for outstanding quality and reliability. Used for handling crushed stone up to 10", ores, slag and other abrasive materials, wet or dry. "Triple-S" and "La Crosse" will serve with equal efficiency and economy in less severe services.



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"SKY-KLEET"®—That name identifies specially-designed rubber cleats available on Goodall Conveyor Belting used for handling packages, small parts, stampings, minerals, chemicals, etc., on fixed or portable conveyors. Cleats are integrally molded to the belt, and spaced at any required distance.



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capabilities and tool wear in the form of upper and lower control limits (X) plus as much other pre-determined information as possible to standardize machine adjustments. Most set-up personnel have their own individual ideas of how machines should be adjusted. This must be eliminated through pre-determined set-up methods and training.

Process inspection

When the machine set-up program is organized so that the variation between machine set-ups has been reduced to a minimum and the machines are taking full advantage of design tolerance, positive process inspection frequencies can be established in accordance with the capabilities of each machine. This prevents expensive 100% inspection of the process or the end product. However, to obtain maximum running time of machines with a minimum amount of process inspection, it is necessary to develop consistent tooling.

Inconsistent tooling does not allow full use of machine capabilities. It results in more frequent process inspection, excessive machine downtime, and possible production of more defective material. The more inconsistent the tooling is, the higher the costs incurred through machine downtime and increased process inspection.

Operator inspection

To detect variation that might enter an operation between process inspection frequencies, an operator inspection frequency is established. For example, if the process inspection frequency were once every two hours, the operator inspection would be approximately every 20 minutes. This reduces the possibility of the production of defective products to that period. Process inspection and the machine operator work as a team to keep the machine producing good products.

Should either the process inspector or the machine operator detect defective products, the products manufactured between inspection frequencies are removed from the production line and 100% inspected to remove the defective product. This screening prevents 100% inspection of the end product. The inspector knows exactly what he is looking for and can accomplish the job easily and economically. It also prevents scrap from further processing and eliminates additional defectives at future operations.

Screening within the process requires the examination of only a small

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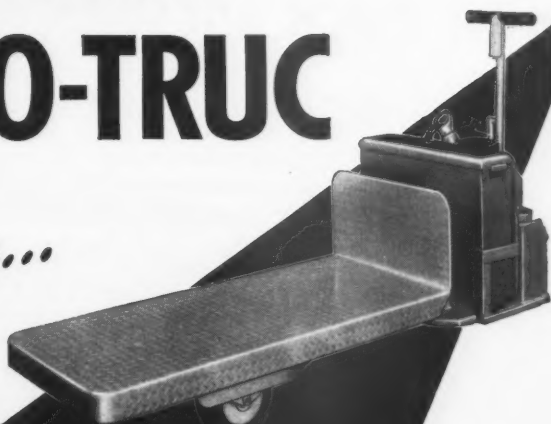
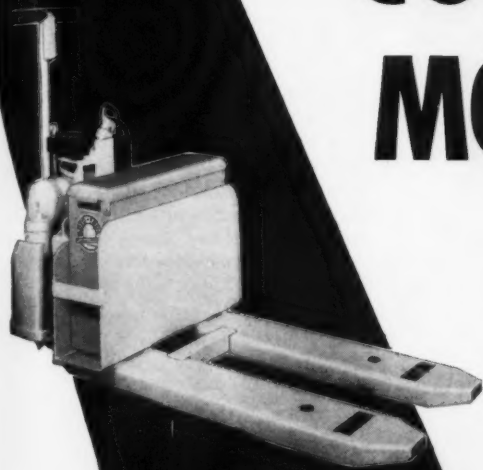
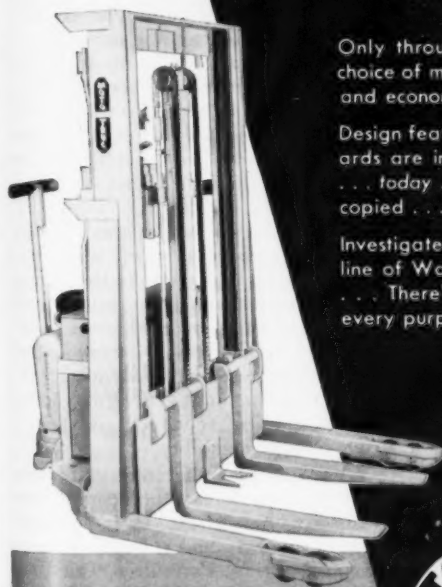
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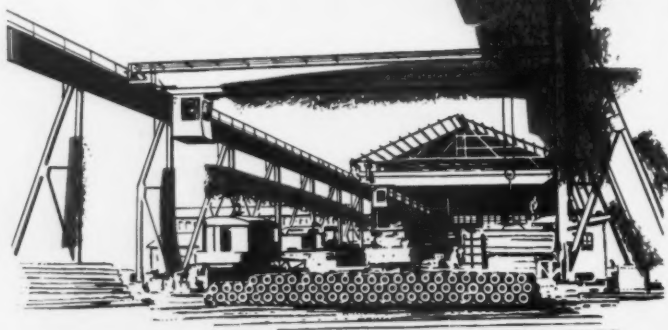
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portion of the products rather than going through all of the good products to eliminate a small percentage of defective items. This screening process is an extremely important part of the process control system, particularly when the consumer controls the design and acceptable quality levels. Process inspectors should use direct reading gauges to allow maximum machine running time, to prevent good material from being rejected, to collect data for further reduction in variation, and to detect any changes in the existing or normal variation.

Control charts needed

Wherever necessary and economical, \bar{X} chart controls should be established for controlling dimensions or characteristics. These charts will record what is actually happening, prevent over-adjustment of machines, and also do much to assist in preventing the production of defective products. A program should be established to minimize downtime or prevent the production of defective products when trouble exists or is apparent.

Final inspection should be on a continuous sampling basis whenever possible so as to enable the detection and correction of any weakness in the process control program, or to effect further economies through the application of controls.

Preventive maintenance, gauges, materials, and other variations should be analyzed and controlled because they can be difficult and expensive to locate. For example, it would be extremely expensive to check a gauge each time it located a defect. However, it could be possible that each time the gauge is wrong. This problem can be minimized through a gauge control program.

Requirements for process controls will vary considerably between manufacturing processes due to the nature of the product being manufactured and the capabilities of equipment used. However, regardless of the amount of controls necessary, they should be applied to the point of getting maximum manufacturing economy and assuring economic stability.

Western manufacturers can do a great deal to increase their competitive capacity on a national basis by developing economy and stability in their manufacturing. Factual cost data reflecting true capabilities of equipment and organization to be used can increase the competitive capacity of bids because it substitutes fact for guess, reduces excessive safety factors, and adds greater assurance to making a profit.



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lation Contractor can select the right insulation for the most dependable service on your job. To develop new and improved insulation materials Johns-Manville maintains the J-M Research Center—largest laboratory of its kind in the world.

2. You get dependable engineering—For 95 years Johns-Manville has been accumulating insulation engineering experience. J-M Insulation Engineers are called upon to solve insulation problems of every type and magnitude, in every industry. Since your J-M Insulation Contractor works closely with J-M Insulation Engineers, he brings to every job a high degree of

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3. You get dependable application—Johns-Manville has set up a nationwide organization of J-M Insulation Contractors to serve you. These Contractors maintain staffs of insulation engineers as well as skilled mechanics thoroughly trained in J-M's proved application methods. You can have absolute confidence in their ability to apply J-M insulations correctly for trouble-free performance.

For further information and the name of your J-M Insulation Contractor, write Johns-Manville, Box 60, New York 16, N. Y. In Canada, 199 Bay St., Toronto 1, Ont.

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A NEW APPROACH

MARY MURPHY, who makes fuel cells for aircraft at the B. F. Goodrich Co. plant in Los Angeles, submitted a safety suggestion recently that brought results. Here's what Mary said:

My bench, a waiting monster,
Stands just stomach high
With wooden teeth that bite me
As I go sliding by.

If you efficiency experts
Could see how splinters clench
My clothes and tear them,
You'd fix this cockeyed bench.

Result: The experts put a strip of metal around Mary's bench and gave her \$7.50 for her suggestion.

PUNCH PRESS GUARD

PATRICK E. SWEENEY, owner of the Continental Machine Works in Oakland, Calif., was dissatisfied with the guards available to keep stray hands out of the path of stamping tools. He devised a guard of his own which can best be described as a simple two-handed tripping device. It

employs two electric switches in series which must be touched in unison in order to release a solenoid lock to permit depressing the foot treadle that operates the press. The inventor has made his device available to other manufacturing concerns. The Sweeney punch press guard is claimed to be simple, inexpensive, foolproof, and efficient.

COMPRESSED AIR eases chain handling

WORKERS at the Naval Repair Facility at San Diego, Calif., are getting a real lift out of a new arrangement for racking heavy chain hoists. Now, instead of having two men lift the hoists by hand, one man easily operates an air hoist powered by an air motor. The hoist moves along an overhead rail above the storage area, driven by a chain and sprocket.

Another advantage of the system is that it allows for storage and repair of chains in half the space formerly required.

Contributions wanted

For each contribution to Efficiency Kinks which the editors feel merits publication, WESTERN INDUSTRY will be happy to award \$5.00. Please send in any details of how your plant solved some problems of design, production, maintenance, or process.

We are particularly interested in ideas that contribute to the efficiency of production and the reduction of operating costs, novel or new methods of pollution reduction and waste utilization, as well as adaptation of old tools and processes to do new jobs.

Send contributions to Efficiency Kinks Editor, WESTERN INDUSTRY, 609 Mission Street, San Francisco 5, Calif.



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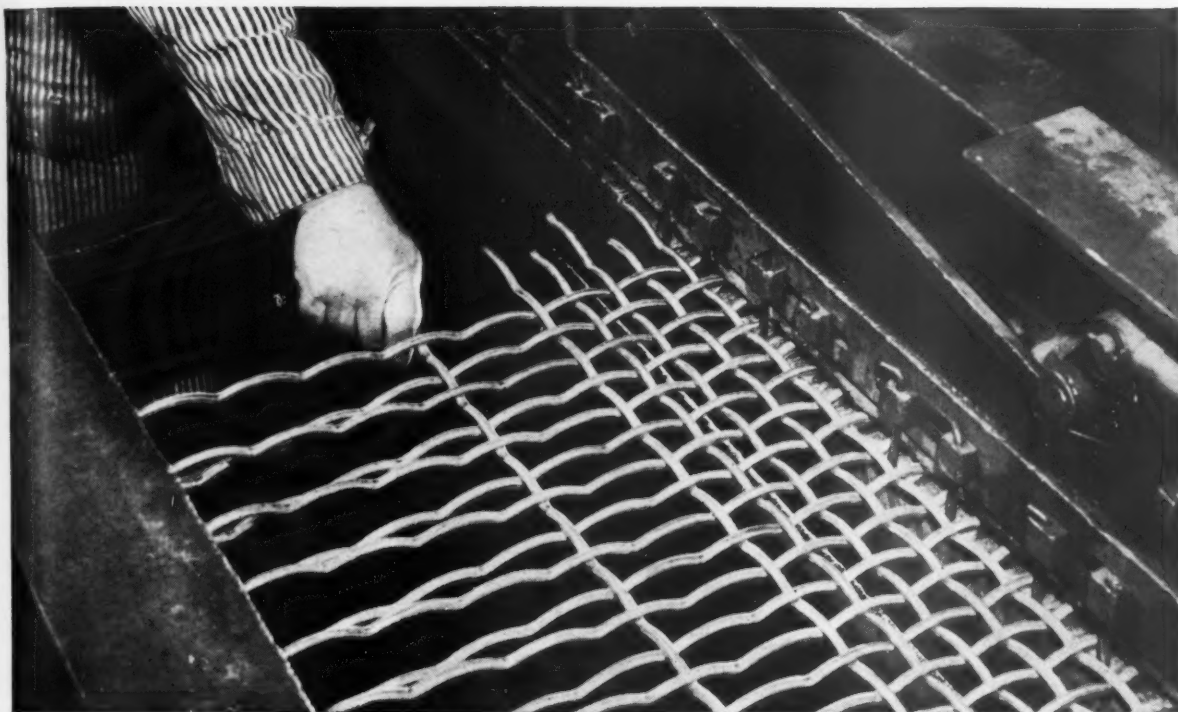
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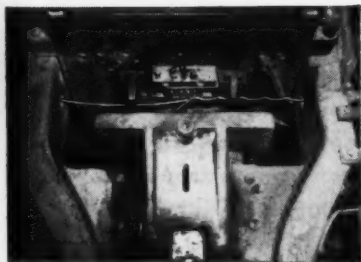
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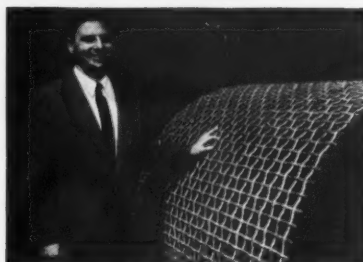


Looming heavy-duty gravel screens, Western Fence & Wire Works, of Portland, Oregon, uses specially selected USS Manufacturers Wire. Shown here is 6-gauge wire being woven in a screen with 11/16" squares for sorting aggregate.

Special wire produces long-lasting gravel screens



Punch Crimp puts an arch crimp in lengths of USS Manufacturers Wire. There are more than 1000 types, grades, and finishes of USS Manufacturers Wire available. And Columbia-Geneva also can produce *tailor-made* wire to meet your own particular specifications.



Production Manager Ira G. Cohns stands beside a trommel screen. He reports, "USS Manufacturers Wire suits our needs exactly". Columbia-Geneva, with the greatest wire-making facilities in the West, also produces wire for everything from bolts to bedsprings.

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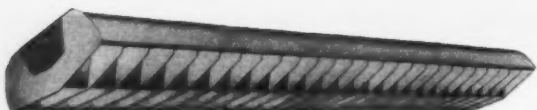


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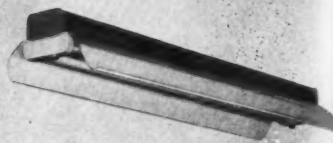


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METAL CONGRESS and exposition

TECHNICAL programs of the Ninth Western Metal Congress are being formulated on a basis of serving the specific needs of plants and production heads in the 11 Western states. Sessions will be presented by several technical societies in the Los Angeles Ambassador Hotel, March 28 to April 1, 1955. The Ninth Western Metal exposition will be held concurrently in Pan-Pacific Auditorium.

Technical groups which have made extensive progress in setting up their programs include American Society for Metals, which stages the congress and exposition; American Welding Society; Society for Nondestructive Testing; and Industrial Heating Equipment Assoc.

PLASTICS FAIR and trade exposition

AN ESTIMATED audience of 18,000 people is expected to attend the World Plastics Fair and Trade Exposition in Los Angeles, April 6 to 10, 1955. Advance interest by plastics raw material purchasers in the 11 Western states gives expectations of a successful show, the first of its kind to be held in the West. Western industries now using plastics in their manufacturing and those interested in applications of plastics to replace materials now employed are the primary concern of the exposition.

LOS ALAMOS MEN receive award

NORMAN C. MILLER and John D. Steely, staff members of the University of California's Los Alamos, N. M., Scientific Laboratory, have been awarded the 1954 Coolidge Award by the Society of Nondestructive Testing. The award was granted for an article, "Some Experimental Findings and Operating Practices in Betatron Radiography," presented before the Society's 13th annual meeting. The article presents a summary of 3½ years' experience at Los Alamos Scientific Laboratory in applying a 22 Mev betatron to various problems in radiographic inspection.

INDUSTRIAL SCIENTISTS meet in Berkeley

THE Industrial Science Section of the American Association for the Advancement of Science will hold its annual all-day meeting at the Hotel Claremont, Berkeley, Calif., beginning at 9:30 a.m. on Thursday, December 30. Problems in basic research, with emphasis on the roles played by government, industry, and universities, will be discussed.

STEEL CONDENSERS for the AEC

UNITED STATES Steel's Consolidated Western Steel Division has completed the fabrication of three all-stainless steel condensers at its Berkeley, Calif., plant for the Atomic Energy Commission. Each of the three condensers has 568 stainless steel tubes, 1 in. in diameter, encased in a shell 9 ft. long and 36½ in. in diameter. Both ends of the condensers are capped.

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PRESS BUILDERS open West Coast factory

A SIGNIFICANT step in filling out the pattern of Western industrial development is the advent of the first major manufacturer of metalworking machinery from the East, good evidence of the growing industrial importance of the West.

The West already has such local builders of one or more items as Axelson and Hufford, but now E. W. Bliss Co., of Canton, Ohio, the world's largest builder of presses, has set up manufacturing facilities in San Jose and established direct sales offices.

A modern plant has been equipped with all the machine tools required and staffed with specialists trained in all phases of press engineering. Besides building new presses, press and machine tool rebuilding will be a featured service, and the facilities will be available to West Coast manufacturers for special engineering projects from the design stage through manufacturing.

In addition to the locally built presses, plans call for stocking such items as inclinables and medium sized presses, and the range of available



FIRST Western plant of a major Eastern metalworking machinery manufacturer.



Edward H. Farmer

equipment will be from 10 to 35,000 tons, mechanical and hydraulic. Bliss replacement parts will be available from stock, as will Bliss-Dieco die sets and supplies.

Rolling mills and accessories and can-making machinery are also part of the Bliss line, and the latter in particular offers a good field in the West because of the size of the canning industry and the increasing use of cans for products of all kinds.

Heading up the San Jose operation will be Edward Farmer, who left his post as assistant works manager of the Bliss plant in Toledo to become superintendent of the fabrication division of Lockheed. He was made works manager at Lockheed in 1952, leaving there this year to become West Coast manager for Bliss. The sales and service offices will be at San Jose and Burbank.

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You do get a wide range of sizes when you buy from SAMSON. These heavy-duty rubber wheels are permanently bonded to precision cast and machined aluminum alloy wheels. They're better because a rubber manufacturer makes rubber products best.

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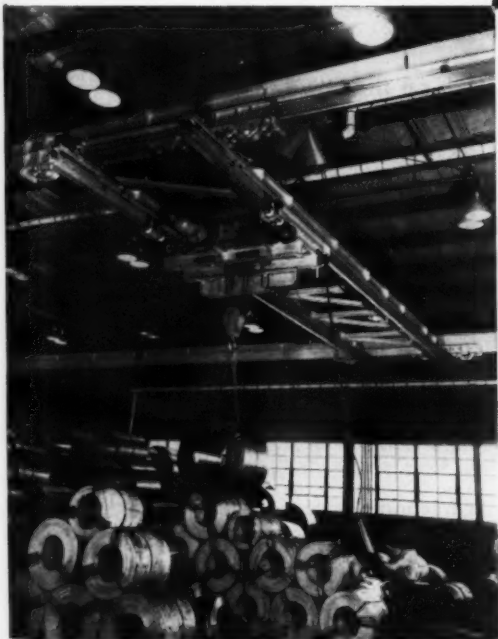
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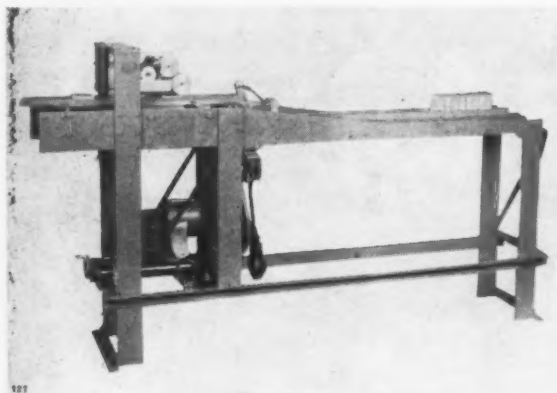
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NEW EQUIPMENT AND MATERIALS

FOR YOUR CONVENIENCE the company address follows each item.

For printing on cartons



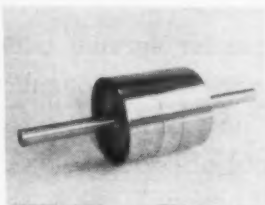
New coding machine imprints small cartons at rate of 70 per minute with a uniform, legible ink impression at any desired location on carton face. Imprinting rubber dies are easily changed. *Industrial Marking Equipment Co., 454 Baltic St., Brooklyn, 17, N. Y.*

Handling with care

New 10,000-lb. capacity low-lift platform truck can handle fragile loads without shock. Equipped with special slow-speed lifting jack, it is well adapted to handling cement blocks, rubber products, baked goods, and the like. *Elwell-Parker Electric Co., 4205 St. Clair Ave., Cleveland 3, Ohio.*

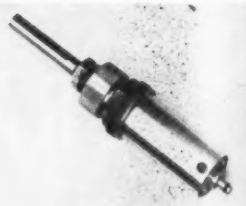
Here's a small magnetic pulley

For more economical installation and service on conveyor belts carrying a 2-in. maximum depth of burden, Cesco introduces this 4 in. diameter permanent magnetic pulley, supplementing larger sizes in line. Produced for belt widths up to 36 in. *Cesco, Santa Rosa, Calif.*



Power drive tool

Micrometric adjustment device of this new tool permits locating a stud or insert's serrated collar to desired depth of parent material. Tool, which can be converted to drive either an insert or stud, fits standard drill chucks and can be used in any drill press or hand power tool. *Rosan Inc., 2901 West Coast Highway, Newport Beach, Calif.*



Diamonds

New Diamond blades are bonded in tungsten carbide, permitting them to be used for cutting highly abrasive materials such as concrete block, firebrick, sandstone, and granite as well as regular materials. Cutting life is said to be greatly extended. Blades are available for all masonry and road saws. *Victory Engineering Corp., 15 Maple Ave., Paoli, Penn.*

Puts stock on the straight and narrow



New hydraulically driven feeding and straightening machine converts a manually operated punch press to automatic operation. It will handle stock up to .125 in. thick. Wide range of feeding speeds permits synchronizing feed and punch operations. *F. J. Littell Machine Co., 4127 Ravenswood Ave., Chicago 13*

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Assembly operation eliminated

The old way:

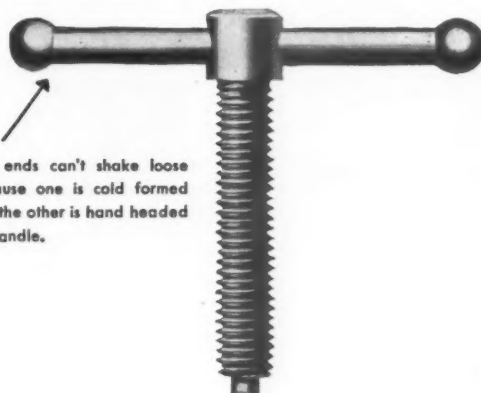
This vise handle was originally cut from bar stock by screw machine. One end of the handle was threaded while the other was machined to a ball head. To complete the assembly a separate internally threaded ball head had to be screwed onto the threaded end by hand.



Ball threaded to end was often lost in use.

The National way:

Our "Special Products Service" showed how this vise handle could be produced faster and at lower cost by cold heading. The handle and one head were cold formed to required dimensions. Then, the handle was inserted through the drilled hole in the head of the jaw adjusting screw and the other end was hand headed. Result... substantial savings in material and production costs.



Ball ends can't shake loose because one is cold formed and the other is hand headed on handle.

Bring your "Special" problems to National

National has the experience and wide range of cold heading equipment needed to solve many "special" problems. Our "Special Products Service" representative will be glad to study your requirements. Write for free copy of National's "Special" fastener booklet.

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Fasteners



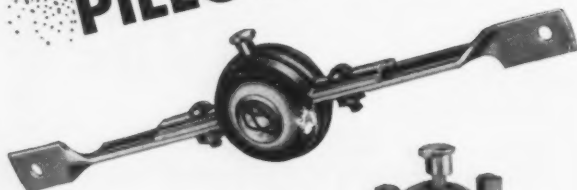
Model Chains



Chester Hoists



FOR Automatic Protection USE *Randall* SELF-LUBRICATING PILLOW BLOCKS



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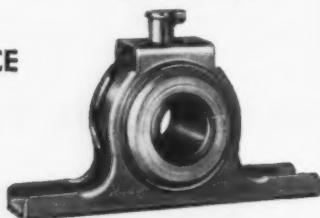


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SAFETY COLLARS
BRONZE CASTING

RANDALL GRAPHITE BEARINGS, INC.

1011 S. Greenlawn Avenue, Lima, Ohio

NEW EQUIPMENT

. . . Begins on page 70.

"Air Miser" cylinder

New type of air cylinder has been designed to eliminate air leakage. Consisting of top and bottom head, cylinder barrel, piston, and rod, cylinder is controlled by two valves through air ports in heads. Top and bottom heads contain exhaust cushion plug; as piston advances it strikes cushion plug and cuts off exhaust, trapping the cushion. Piston is packed with Neoprene cups to prevent air leakage around cylinder. *Sumner Iron Works, Box 1006, Everett, Wash.*



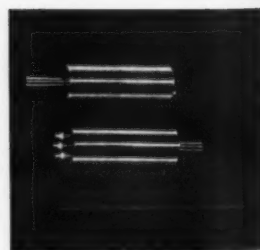
Rigid in construction—flexible in use

New DoAll power cut-off saw, states manufacturer, has a whole set of exclusive adjustments and hydraulic controls for feed pressure, band tensioning, and infinitely variable speed change, which together constitute a radical change in design. Hand manipulation controls up or down direction of saw head, sawing or feed pressure (which is hydraulically maintained), blade speed, rate of coolant flow, and automatic or manual indexing. *DoAll Co., 254 N. Laurel Ave., Des Plaines, Ill.*



Transducer for elevated temperatures

Extensometer linear transducer is a newly introduced instrument for measuring linear motion, relative displacement, position, and vibration — adaptable to use in ovens, hot fluids, radioactive regions, temperatures between minus 160 and plus 1,300 deg. F. Linear ranges available from 1 to 32 in. Resolution of all models is .000,000,1 in.; operating sensitivities to 5 v. per inch; linearities to .1% of linear range. *Crescent Engineering & Research Co., 14828 Arrow Hwy., Baldwin Park, Calif.*



Fortifying petroleum

Fuel oil additive, Kemix Auxiliary Factor No. 10, is claimed to upgrade and fortify petroleum products at comparatively low cost. This product, introduced ten years ago, is manufactured by Kemix Laboratories of West Springfield, Pa., and distributed by *Peninsula Associates, 291 Main St., Los Altos, Calif.*

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MANUFACTURERS OF AIR PROCESSING SYSTEMS

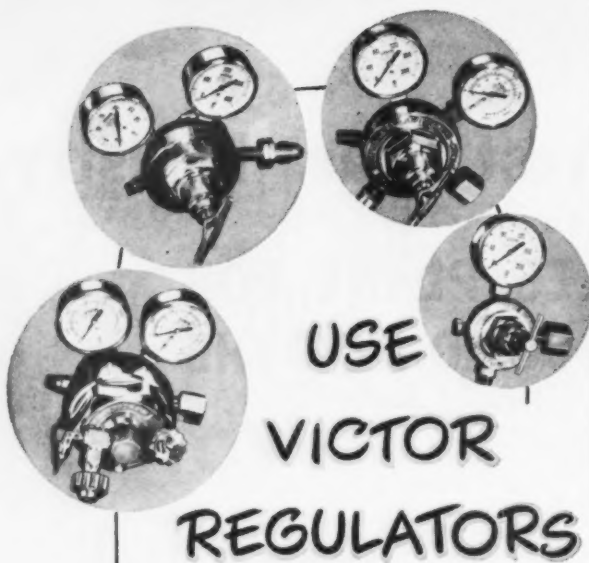
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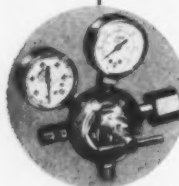
823 SKINNER BLDG., SEATTLE, WASH.



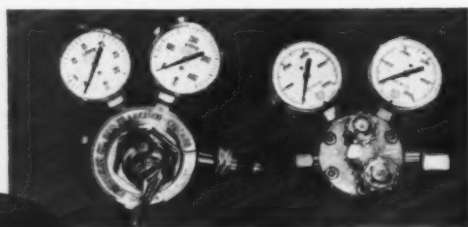
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NEW EQUIPMENT

Begins on page 70.

Fork lift portable elevator

This 2,000-lb. capacity Revolvator unit is moved manually from one point to another but derives lifting power from two 6-v. automotive type storage batteries driving pump motor of hydraulic mechanism. Mast telescopes to 68 in. and forks lift from a lowered height of 2½ in. above floor to 85 in. above floor. Revolvator Co. Distributed by: *Ira G. Perin Co., 575 Howard St., San Francisco.*



Spark-proof lift truck

Use of Buda diesel engine in this new line of trucks eliminates hazards due to possible electrical sparks. Electric battery wiring, starters, generators, and other electric instruments are not used. Low engine surface temperatures are further reduced by means of water-cooled exhaust manifold, and water muffler is also used, eliminating possibility of sparks passing out engine exhaust pipe. Trucks are available with static-conductive tires, protective wood bumper on three sides, and non-sparking metal forks. *Buda Co., Harvey, Ill.*

Attention, industrial engineers!

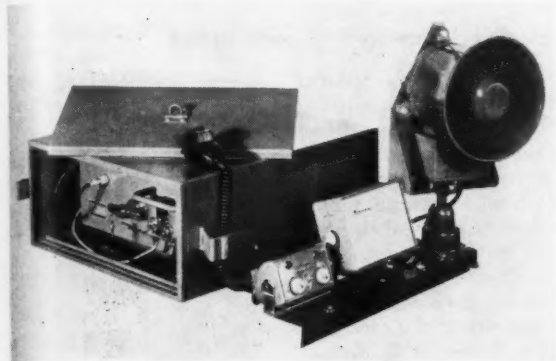
Inexpensive Spy Camera—smaller than a matchbox, weighing less than ¾ oz., equipped with an f4.5 lens and 1/30 sec. shutter speed—may have usefulness for industrial engineers in making time and motion studies. *American Homecraft Co., 3714 N. Milwaukee Ave., Chicago 41*

Short case sealer with long capacity



Extra short Sealmaster case sealer, Model 53-8, is designed for smaller plants where space is a premium. It is only 8 ft. long and requires less than 28 sq. ft. of floor space. Sealer automatically glues and seals top and bottom, or top only, as desired. *Elliott Manufacturing Co., 1735 Ventura Ave., Fresno 1, Calif.*

"Packaged" two-way radio system



This new low-cost two-way radio system is especially recommended for use in industrial areas with high audible noise levels from machinery, trucks, etc. System consists of receiver, transmitter, and power supply with audio booster amplifier, all fitting into standard 15 in. housing. Operates interchangeably with either 6- or 12-v. battery installation. Basic radio may be modified to provide a custom installation. *Motorola Communications & Electronics, Inc., Technical Information Center, 4501 W. Augusta Blvd., Chicago 51*

Sectional belt conveyor

Here is a complete set of belt conveyor components pre-engineered for customer assembly. They are available in both 18- and 24-in. belt sizes, with capacities ranging up to 150 and 250 tons per hour respectively. Components include belt, carrier and return roll, head and tail pulley assemblies, drive assembly, normal duty roller type holdback, spring type belt cleaner, bent plate decking, and Swivel-piler. *Stephens-Adamson Mfg. Co., Standard Products Division, Aurora, Ill.*

Changes in Stanley sealer

Redesign of Stanley A sealer tool includes two major changes—heavy zinc plating on all metal parts of sealer, and ethyl cellulose handles replacing former plastic ones. Manufacturer states these changes assure better performance and longer service for tool, which can be used for sealing $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, and $\frac{3}{4}$ in. steel strapping. *Stanley Works, New Britain, Conn.*

Bumblebee welders

New industrial line of AC Bumblebee welders, NEMA rated 300, 400, and 500 amp. models, feature stepless current control, silicone insulation, aluminum coil windings, and large current scale which can be read from a distance. Simplicity of design results in minimum of vibration and mechanical wear, as well as easy maintenance. *Air Reduction Pacific Co., 220 Bush St., San Francisco*



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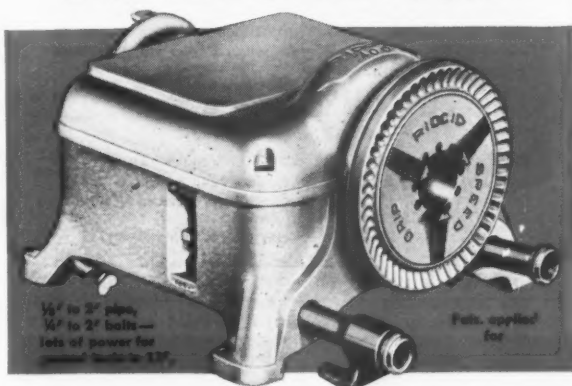
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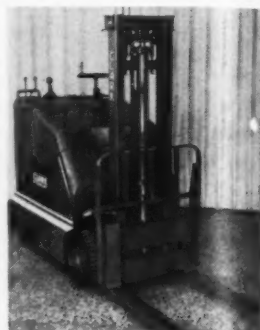
Western Factory Sales Representative
GRETHER & GRETHER, P. O. Box 47, Stockton, California

NEW EQUIPMENT

Begins on page 70.

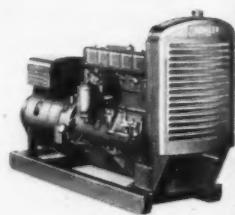
Electric "Stoway" is redesigned

Easier steering, more efficient hydraulic control of lifting and tilting mechanisms for smoother handling of fragile loads, improved hydraulic braking for increased safety—these are a few of the changes in Stoway stand-up type electric fork truck. *Clark Equipment Co., Industrial Truck Division, Battle Creek, Mich.*



New 15-kw. electric plant comes in six models

Available in six different models, with remote control or stand-by starting and with varying voltage outputs, new gasoline-powered AC electric plant has 6-cylinder engine which produces 51 hp. at 1,800 rpm. Plant is water cooled with large radiator, belt-driven centrifugal pump, and blower fan. *Kohler Co., Kohler, Wisc.*



New box in NesTier line

Model 360, latest addition to NesTier line of all-welded 14-gage steel boxes, is a materials handling aid midway between a tote box and a heavy corrugated bin-type container. Boxes tier in rigid stacks when filled, each resting on handles or bails of box below, and empty boxes nest. Chas. Wm. Doepke Mfg. Co. Distributed by: *M. E. Canfield Co., 419 E. Third St., Los Angeles.*



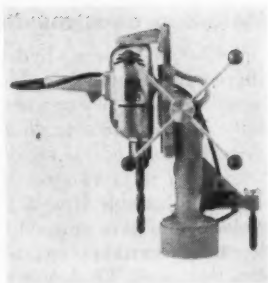
No shock starts here

New shock-absorbing hook assembly for overhead conveyor-truck systems, using chain and hook hitches, increases production by permitting faster travel, prolongs life of conveyors and trucks, and reduces possibility of load spillage. Compression spring eliminates "shock starts" and reduces weaving on turns. *Nutting Truck and Caster Co., 1201 W. Division St., Faribault, Minn.*



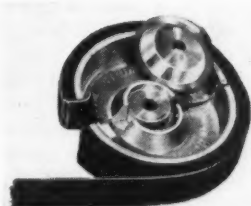
New press has pull

Bux magnetic press has pull of over 800 lb., yet weighs only 34 lb. Equipment is designed for metal drilling operations on walls, ceilings, and other difficult angles, and also for drilling, reaming, tapping, and countersinking of structural shapes, bar stock, machinery, jigs, and fixtures. Operates on 115 v. AC or DC. **Bux Manufacturing Co., 100 Cypress Ave., Los Gatos, Calif.**



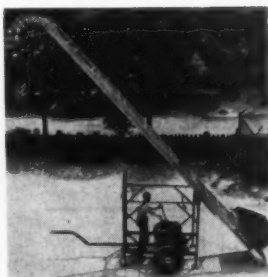
Drum sander has first anniversary

Cone-Loc drum sanders are made of high tensile aluminum alloy and use ordinary coated abrasives, purchased in "economy rolls," for safe sanding at high speeds. In their first year of service in industrial plants, manufacturer reports, there have been no structural failures among Cone-Loc drum sanders. **American Diamond Saw Sales, Portland 9, Ore.**



Self-erecting hoist

Lad-E-Vator tower is quickly pulled up to working level by motor mounted on new Trail-Erector trailer unit. Lad-E-Vator hoist illustrated is fitted with scoop for handling loose materials. Other uses are as a skip hoist and with wheelbarrow platform. Unit is moved by towing truck or car from one job to next—ready to operate 10 minutes after it arrives. **Campbell Equipment Co., 2122 N. Menard Ave., Chicago 39**



Low-inertia high-speed counter

Rayconter Model 550 cumulative counter is rated for production-control applications at rates up to 3,000 per minute. Illustration shows unit which registers with four pointers on four concentric scales reading from center outward. Low-inertia mechanism minimizes error from carry-over. **Raycon Corp., 934 Willow St., Redwood City, Calif.**

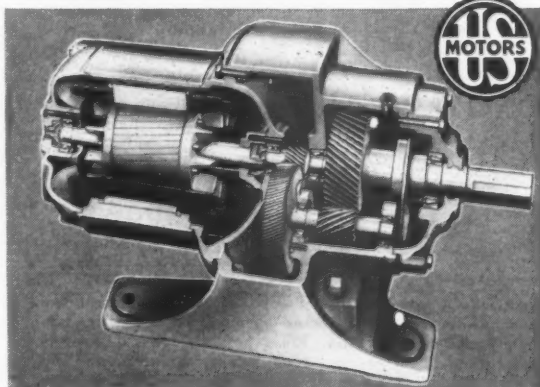


IN YOUR OPINION, WHICH PINION?

...for longest life in a
garmotor



In an internally geared motor the pinion on the motor shaft is the vital link between motor and gearing. Now compare the U. S. Syncrogear motor pinion with the common type. Note the extra large section area of the U. S. design. It has a long solid shank that anchors into the motor's hollow shaft, whereas the ordinary shell type has a small section area, short keyed. Obviously the U. S. design is most substantial, longer lasting, more resistant to deflection and can carry high speed loads far more safely than the common designs.



The only motor with BUILT-IN pinion
U. S. SYNCROGEAR



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Call **Nutting** For **TRUCKS WHEELS CASTERS**



FIG. 1482
Heavy duty bar handle platform truck



FIG. 1901-X
"Auto-Load" Barrel Truck



FIG. 1152 DPL
Light weight 2-wheel utility truck



FIG. 1901
Balance-type platform stake truck



FIG. 16
Western Pattern with Steam Bent Handles



FIG. 219
Golden Gate Pattern

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See Yellow pages for your local sales representative

NEW EQUIPMENT

... Begins on page 70

Moto-Bug adds muscle

A 1,500-lb. capacity hydraulic fork lift attachment is now offered for Model R-15 Moto-Bug, which was originally introduced as a power wheelbarrow for construction work and has grown into an all-around materials handling tool. New hydraulic unit is rated to lift maximum $\frac{3}{4}$ -ton load to height of 7 ft. in 14 seconds, with standard forks 30 in. in length, adjustable from 6 to 32 in. in width. Model R-15 is claimed to have unusual versatility for service in freight depots, industrial plants, receiving docks, and general construction work. *Kwik-Mix Co., Milwaukee 16, Wisc.*

New way to move heavy equipment

Multiton roller skids are suited for any kind of surface moving. They will handle up to 55 tons each; are designed so that at least 9 in. of hardened steel rollers are in constant contact with floor; when equipped with swivel top plate, can accomplish even 90-degree turns. Mark 4 model is $10\frac{1}{2}$ in. long x 5 in. wide x $3\frac{3}{4}$ in. high. *Stokvis-Edera & Co., Inc. Distributed by: Robco Inc., 5348 Jillson St., Los Angeles 22*



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ALLIGATOR V-BELT FASTENERS

★ In this way you can make up V-Belts in *any length* to fit *any drive* the fast economical way—V-Belts that perform exceptionally well.

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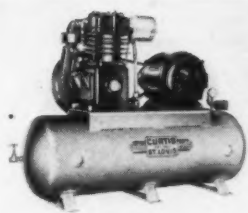
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Order From Your Distributor

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Air compressors streamlined

New line of Curtis air compressors, timed to celebrate 100th anniversary of company's pneumatic machinery division, offers new designs and operating characteristics. Cooling fins are redesigned and enlarged to produce greater cooling area. Disc type valves are made of heat treated alloy steel, ground and lapped to optical precision for quietness and efficiency in operation. Compressor lubrication system consists of only one moving part—the oil pickup ring which revolves on crankshaft. *Curtis Manufacturing Co., Pneumatic Machinery Division, St. Louis 20, Mo.*



Lifeline for high places

New safety device for men who work in high places, the Safe-Hi Rope Grab, can be used in any situation where a vertical rope can be hung in working area. It is a metal grip which attaches instantly around $\frac{3}{4}$ in. manila rope and is specially designed to break the shock of a fall. Weight is $2\frac{1}{2}$ lb. for device, lifeline, and belt. *Rose Manufacturing Co., 2700 W. Barberry Pl., Denver, Colo.*

ATOM-ARC electrodes

New low hydrogen electrode, marketed under trade name ATOM-ARC, is available in strength levels and chemistry of 7016, 8016, 9016, 10016, 12016 AWS grades. It is claimed that this is first time iron powder has been incorporated into coating of a low hydrogen electrode, making possible use of higher welding currents with either AC or DC and also increasing the number of pounds of weld metal deposited per hour. *Alloy Rods Co., Lincoln Highway West, York, Pa.*

Ribbed industrial siding

This new product is offered for more attractive low-cost siding on industrial buildings. Intended primarily for use on frame type structures, but suitable also for facing sheet on concrete block buildings, siding sheet has ribbed design which is achieved by trapezoidal corrugations. Using two layers of aluminum siding with a center layer of glass fiber insulation, a wall can be built which, manufacturer states, has an insulation value equivalent to that of a 24-in. brick wall. Available in .032 in. thickness and from 5 to 18 ft. lengths. *Aluminum Co. of America, 745 Alcoa Bldg., Pittsburgh 19, Pa.*

Westcoaster carries half-ton payload

New electric pick-up truck carries two passengers in addition to payload. Powered by six heavy-duty storage batteries producing 36 volts, truck has speed up to 8 to 10 mph. and enough power to climb hills ordinary tractors can climb. Recommended for plants, warehouses, refineries, supply depots, and similar uses. *West Coast Machinery, Inc., 1801 E. Charter Way, Stockton, Calif.*



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CASE STUDY

DESIGNATION: Female Hinge

METAL USED: Stainless Steel (AISI 302)

QUALITY CONTROL: Chemical and physical affidavits furnished. Test Bars submitted. Produced with 100% X-Ray requirements.

PARTS: Designed and cast as single unit. Formerly composed of three units welded together.

ADVANTAGES: Strengthened with re-inforcing ribs in U-Bracket. Weight decreased without decrease in strength. Reaming holes only machining required. Formerly holes countersunk outer sides only, now cast with radii on both inner and outer sides. Greatly reduced cost.

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"Field Facts"

... data sheets on Hyster equipment describe problems involving construction work and solutions to those problems using company's equipment. Backhoes, grid rollers, and towing winches are shown in several different problem applications. *Hyster Co., 2902 N.E. Clackamas, Portland, Ore.*

New alloy

New high-temperature alloy, NA-22H, is featured in new 4-page Blaw-Knox folder. Various uses of alloy, which will withstand operating temperatures up to 2,200 deg. F.—in endothermic gas generators, annealing furnace tubes, radiant tubes, furnace fans, and other applications—are described and a table of high temperature properties of the alloy given. *Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh, Pa.*

Anti-rust paint

New 4-page information bulletin describes Chem Industrial's complete line of OVERUST anti-rust paints. Chemical properties, application methods, and coverage figures are listed for OVERUST black, red, gray, green, aluminum, and clear. Bulletin claims that paints will stand up under rust conditions which would quickly destroy ordinary paints. 4591C. *Chem Industrial Co., 3784 Ridge Road, Brooklyn 9, Ohio*

Plant tour

Illustrated booklet features a highlight tour of Allis-Chalmers' West Allis Works, where tractors and general machinery are manufactured. Foundry, machine shops, research laboratories, offices, and examples of equipment produced are pictured and briefly described. *Allis-Chalmers Manufacturing Co., Box 512, Milwaukee, Wisc.*

Electric hoist info



Heavy duty construction and operational features of new line of LeTourneau electric hoists are illustrated and explained in new 6-page folder. Cut-away view shows detailed engineering of hoist, and design points are labeled. Line drawings show two of hoist's features, combination motor-load brake and gear reduction design. Applications of this equipment are pictured. *R. G. LeTourneau, Inc., Longview, Tex.*

Data on stainless piping

Data of interest and value to engineers and designers having problems involving stainless steel piping are included in new Babcock & Wilcox bulletin. Bulletin outlines methods of bending and joining stainless pipe and discusses problem of light wall vs. heavy wall pipe. Included are a table of dimensions and weights of pipe and technical data on mechanical and physical properties of stainless steel piping. TB-356. *Babcock & Wilcox Co., 161 E. 42nd St., New York, N. Y.*

Lubricating equipment

New 52-page catalog describes Aro's complete line of lubricating equipment. Catalog gives condensed data on company's pumps, reels, oil drains, automatic transmission fluid dispensers, lubricators, gun fillers, nozzles and adapters, air line couplers and connectors, hydraulic grease fittings, and parts and accessories. Installation layouts are shown. 20. *Aro Equipment Corp., Bryan, Ohio.*

Internal purifier

... for delivering clean vapor and gases from steam drums, flash tanks, evaporators, packed towers, bubble-cap towers, deodorizers, and stills is described in 4-page bulletin. Folder contains dimensional drawing illustrating use of Hi-eF purifiers in two typical installations, cut-away drawing illustrating flow of vapor through unit, table of dimensions, specifications, and a description of operation of unit. 103. *V. D. Anderson Co., 1935 W. 96th St., Cleveland, Ohio*

Management counseling services

... of Emerson Engineers are outlined in attractive new 8-page booklet. Booklet covers counseling procedures in general business studies, administration and organization functions, marketing, production, and office services and includes info about the firm. *Emerson Engineers, 30 Rockefeller Plaza, New York, N. Y.*

Aluminum info

New indexed 24-page booklet contains up-to-date info on Kaiser Aluminum mill products and services. Booklet covers data on aluminum alloys, forms, properties, applications, and availability. Condensed tables and charts provide convenient reference material. *Kaiser Aluminum & Chemical Sales, Inc., Oakland 12, Calif.*

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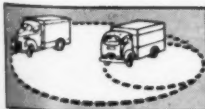
Take a Look at your delivery schedule. If you are still using motor trucks which were never designed specifically for delivery work, chances are you are wasting money—every trip! Compare White. You'll see that the new 3000, with its compact maneuverability, with its extra capacity and shorter wheelbase, can logically deliver more in less time...at lower unit cost. Your Local White Representative has the facts. Plan to call him today.

7 UP BOTTLING COMPANY, Santa Barbara, California, has gained a full twenty-five per cent payload by replacing old-style equipment with this new Low-Bed White 3000. The Low-Bed permits an extra row of cases—without demanding extra reach from the operator working the load.

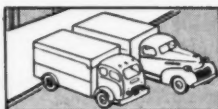


WHITE 3000

Check these White Cost-Saving Advantages



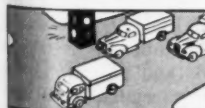
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American Viscose Corporation, is one of the world's largest producers of rayon, acetate, cellophane, meat casings, plastic resins, and fabric finishes. To help handle the millions of pounds of wood pulp, alkali, and acid moving through 8 plants in Pennsylvania, Virginia and West Virginia, American Viscose uses C&D Slyver-Clad* batteries as a major source of power for their industrial trucks employed in daily operation. For American Viscose, like hundreds of other important companies, has found it pays to power with C&D Slyver-Clad batteries.

C&D Slyver-Clad batteries are approved as standard equipment by all electric truck manufacturers. For further information, write for catalogs.

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HELPFUL LITERATURE

Payloader attachments

"Useful Attachments for Payloader Tractor Shovels" illustrates and describes rotary "V" and trip-blade snow plows, hydraulic backhoe, back-filler blade, crane hook, lift fork, lumber-log rack, pickup sweeper, cabs, winches, scarifier teeth, land-clearing rake, and tine fork. Company's line of Payloader tractor-shovels for indoor and outdoor use are also shown. *Frank G. Hough Co., 889 Seventh St., Libertyville, Ill.*

Quick pics

Two models of Beckman & Whitley high-speed framing cameras are described in new 4-page folder. Designed for engineering and research studies of combustion, corona discharge, explosions, plastic and elastic deformation, and shock-wave phenomena, cameras are claimed capable of 1,200,000 and 2,400,000 frames per second, with a total of 25 frames. Operation of camera, details of optical system, special features, and an overall schematic view of complete camera system are included. 189. *Beckman & Whitley, Inc., 1032 E. San Carlos Ave., San Carlos, Calif.*

Miniature transducer

New leaflet describes miniature flush-diaphragm strain-gage transducer recommended for applications requiring small size and light weight where sensing diaphragm can be located directly in surface under pressure. Illustrated leaflet provides dimensional and construction info in mechanical drawings and gives electrical circuitry. Operating parameters are tabulated for standard pressure ranges of 1/2-in. diameter transducers, including 2 1/2, 5, 10, 25, 50, 100, and 200 psi. PT654. *Electronic Engineering Associates, Ltd., 1126 Brittan Ave., San Carlos, Calif.*

Scaffold equipment

Newly published 2-page catalog sheet gives info on Waco's light-weight, portable scaffold jack. Literature describes jack: a free-standing support for scaffold planks, with dual-purpose head which permits use of either planks or stringers. Included are application photos of jacks being used in offices, inside and outside commercial buildings, and for residential work. SJ-1754. *Waco Manufacturing Co., 3555 Wooddale Ave., Minneapolis 16, Minn.*

Submersible pump bulletin

Peerless dynamic submersible pump for wells up to 280 ft. deep is described and illustrated in new bulletin. Design and construction features are shown in diagrams and cut-away drawings, and a pump selection chart is given. Bulletin claims pump delivers up to 940 gallons per hour at shallow settings. B-2455. *Peerless Pump Division, Food Machinery and Chemical Corp., 301 West Avenue 26, Los Angeles 31*

"Data Processing Instruments"

Consolidated Engineering's "electronic yardsticks" are described in 12-page general catalog on company's complete line of data-processing equipment. Photos, technical specifications, descriptive diagrams, and condensed descriptions of this equipment are included. Catalog covers recording oscillographs, galvanometers, amplifiers, miniature transducers, and other specialized instruments. CEC-1301. *Consolidated Engineering Corp., 300 N. Sierra Madre Villa, Pasadena 8, Calif.*

Constant speed motor

New leaflet describes Dalmotor unit for continuous-duty applications calling for constant speed under varying voltage, load, and ambient conditions throughout a wide range of temperature, pressure, and humidity variations. Performance curves are included in leaflet, giving data on output watts, rpm., efficiency, and input amperes plotted against torque output. SC-23. *Dalmotor Co., 1377 Clay St., Santa Clara, Calif.*

Versatile crane bulletin

Illustrated 8-page bulletin describes Austin-Western's indoor-outdoor hydraulic crane. Included with specifications and performance data are diagrams on working ranges, manual boom extensions, and minimum aisle widths for turns, as well as info on attachments and special equipment. AD-2253. *Austin-Western Co., 601 Farnsworth Ave., Aurora, Ill.*

Air cylinder data

Complete engineering data on 12 leading lines of air cylinders are given in ASTE Air Cylinder Data Package. Data package includes J. I. C. pneumatic standards and glossary and is part of Society's regular data sheet service. *American Society of Tool Engineers, 925 Book Bldg., Detroit 26, Mich.*

Pressure-treated Douglas fir

Interesting 12-page booklet lists and pictures applications of pressure-treated Douglas fir for structural purposes. Booklet discusses three types of treatments — creosote, pentachlorophenol, and Wolman salts—and gives specifications of use for each type of treated timber. According to booklet, this treated timber is stronger than concrete or steel. *Pope & Talbot, Inc.* 3070 N.W. Front Ave., Portland 10, Ore.

101 suggestions

New edition of "Good Operating Practices," Johns-Manville's 12-page illustrated brochure, contains 101 suggestions for maintaining plant buildings and equipment. Included are latest recommendations for getting best service from insulations, packings, refractory products, roofings, and friction materials. 1P-9A. *Johns-Manville*, 22 E. 40th St., New York 16, N. Y.

Decimal chart

New 3-color, plastic coated desk-size decimal equivalent chart is offered by manufacturer of metal fasteners. Chart is also available in 16 x 23-in. wall size. *John Hassall, Inc.*, Box 3186, Westbury, Long Island, N. Y.

Bolting for structural joints

"High Strength Bolting for Structural Joints," 16-page illustrated booklet, describes use of high-strength bolts in joining structural steel members. Advantages of cost saving and performance characteristics are listed and specifications for assembly, tables on bolt tension, torque values, chemical requirements, and mechanical properties are given. 375. *Bethlehem Pacific Coast Steel Corp.*, San Francisco 19

What's it worth

New folder describes services of General Appraisal Co. to metal working plants. The various uses of an appraisal and the company's qualifications for making expert evaluations of machinery and equipment are outlined. *General Appraisal Co.*, 408 Marion St., Seattle

Voltage regulator news

New-type all static voltage regulator for 400 cycle AC machines is described and illustrated in 4-page bulletin. Characteristics of Leach's INET RX400 are shown, and specifications on construction, installation, and operation included. T-8400. *Leach Corp.*, 4441 Santa Fe Ave., Los Angeles 58

Materials handling in small plants

New illustrated 28-page treatise, "Why the Small Fork Truck?" shows how small and medium-sized plants can compete with big business in materials handling efficiency. Booklet describes how small power fork truck can be used in upper story installations and for loading and unloading motor trucks, where floor or spring capacities make it impossible to use heavy fork trucks. Pictures and diagrams show design principles of power fork construction. Analyzed are space, time, and labor factors involved in small plant operation and material handling. *Market Forge Co.*, Material Handling Division, Everett 49, Mass.

Management consultants

Interesting brochure, "How the Management Consulting Profession Serves American Business," is offered to meet need for info on this service. Brochure explains role of consulting engineers, problems they encounter, choosing a consultant, and the profession's code of ethics. *Association of Consulting Management Engineers, Inc.*, 347 Madison Ave., New York 17, N. Y.



Industry's safest safety curb!

—one of five safety features you get in every Magcoa Dockboard—When you buy a Magcoa Dockboard you have two main things in mind—to increase loading efficiency and speed, and to increase loading safety. The exclusive Magcoa Dockboard safety curb helps you do both . . . with the emphasis on safety. That's what a safety curb is for.

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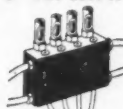
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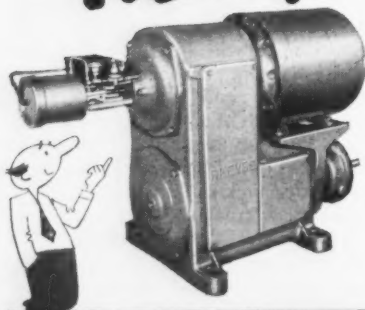


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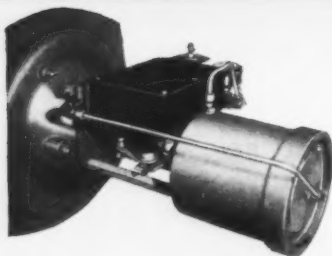
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HELPFUL LITERATURE

Port of Tacoma

Interesting and attractive 16-page booklet on Washington's Port of Tacoma is available for firms seeking industrial sites in that area. Brochure gives detail about the city of Tacoma and its advantages to manufacturers, carriers, shippers, and distributors. Favorable labor picture, low-cost power, water supply, excellent transportation, and low-cost industrial land are cited in "Invitation to Industry." *Port of Tacoma, Box 1612, Tacoma, Wash.*

"Water in Process Use"

Folder outlines value of a broad approach to industrial water problems through an overall survey of process water. Folder, published by a water treatment consulting firm, gives examples of how a process water survey, to find out how water is being used in a plant, can have some or all of the following benefits: conservation of critical materials, reduction of water use, and savings in waste-water treatment. *Hall Laboratories, Inc., 323 Fourth Ave., Pittsburgh 30, Pa.*

Conveyor belt chart

New color chart gives engineering data for standard conveyor belt constructions. Chart shows graphically six characteristics for eight most popular ply and material combinations of conveyor belts—theoretical ultimate strength, actual ultimate strength, fastener strength, operating strength with fasteners, operating strength with splice, and troughing index. *Quaker Rubber Corp., Division of H. K. Porter Co., Inc., Tacony and Comly Sts., Philadelphia, Pa.*

Cylinder manifolds

These sheets on cylinder manifolds by National Welding provide considerable data about design and construction of manifolding equipment. Ten-page section from company's "National Notes" describes and illustrates many phases of the construction and application of cylinder manifolds. *National Welding Equipment Co., 218 Fremont St., San Francisco 5*

Trolley conveyors

Eight-page brochure has the title: "10 things hired hands can't do become 10 ways that Junior, the lightweight trolley conveyor, can cut production costs." Text introduces new 2½-in. I-beam track which makes unnecessary cutting 6-in. Junior I-beam in half to use as rail for trolleys. *Jervis B. Webb Co., 9301 Rayo Ave., South Gate, Calif.*

Air-cooled engine folder

. . . is available to Kohler distributors and dealers on company's line of equipment. Three-color folder, for local promotional use, gives complete specifications on four air-cooled engines and the various options offered with each. *Kohler Co., Kohler, Wis.*

"Tools of Automation"

New 12-page booklet shows Reliance's motors, V*S drives, and controls for automation of single machines or continuous processes. Illustrations and sketches accompanying each section of the booklet to help tell automation story. Captioned photos illustrate automation at work in many industries. *Reliance Electric and Engineering Co., 1076 Ivanhoe Road, Cleveland 10, Ohio*

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BETTER in less time with
less water and work by

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coal cars, paper plant
rollers and screens, building
exteriors, boilers, mast
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protected aircraft, conveyor
belts, and thousands more.



Welding equipment data

Four-page leaflet illustrates G-E's new Fillerarc welding equipment and accessories. Fillerarc welders, guns, and wire drives are described, their features listed, and an application shown. GED-2068. *General Electric Co.* Available from local distributors.

Strapping equipment

New 6-page brochure describes Gerrard's line of Bulkholder heavy-duty strapping, strapping tools, and accessories. Brochure contains descriptions and how-to-order info on tensioning tools, sealers, seals, cutters, and combination units. Photos illustrate all major product applications—carload bracing, export crating, palletizing, bundling, unitizing and binding heavy-duty concrete forms. *A. J. Gerrard & Co., Melrose Park, Ill.*

Visualizing plant layouts

"The ABC of the Repro-Temple Method of Plant Layout," explains and illustrates this method of plant layout. Brochure contains experimental sheet of Repro-Temples, with directions for use. *Repro-Temples, Inc., Oakmont (Allegheny County), Pa.*

"Turbine Pumps for Industry"

... describes and illustrates latest models of Smith's vertical turbine pumps. Eight-page bulletin shows characteristic curves and gives detailed description of principal components. Drawings showing typical applications are included. 735-1. *A. O. Smith Corp., 5715 Smithway St., Los Angeles 22*

Leaded alloy steel

New bulletin describes Rycut 40, fast machining alloy steel. This leaded steel, containing .40 carbon, is said to increase production of machined parts, give longer tool life, permit smoother finish of machined parts, and allow closer tolerances to be maintained. Bulletin includes case studies and machining comparisons. 14-5. *Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80*

Dynamotor data

New condensed catalog covers Gothard line of commercial, military, and mobile dynamotors. Catalog includes info on AC to DC power conversion provided by various units. 410. *Gothard Manufacturing Co., 2110 Clear Lake Ave., Springfield, Ill.*

"Press" release

Eight-page catalog covers Cleveland Crane's new line of Steelweld two-point presses. Construction features of these straight-side, tie-rod presses, which range in size from 160 to 500 tons capacity with bolster areas from 48 x 42 in. to 132 x 60 in., are listed. A complete table of specifications is included. 2018. *Cleveland Crane & Engineering Co., Wickliffe, Ohio*

Industrial tractor leaflet

Four models of Barrett Tractor Ox industrial tractors for use in confined space are shown in 4-page leaflet. Dimensions and specifications of Model SX-24, standup riding type tractor, are included. 544. *Barrett-Cravens Co., 628 Dundee Rd., Northbrook, Ill.*

Materials handling job study

Fast and flexible handling system, built around Towmotor fork lift trucks, is described in new job study. Study cites production increase of 80% resulting from use of this equipment in pallet manufacturer's plant. Details of this operation have been assembled in job study. 125. *Towmotor Corp., 1226 E. 152nd St., Cleveland 10, Ohio*



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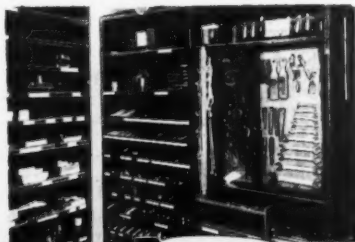


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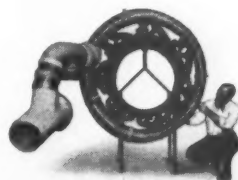


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WESTERNERS AT WORK

CALIFORNIA

American Potash & Chemical Corp.

Joseph C. Schumacher, former vice president and director of research of Western Electrochemical Co., joins this Los Angeles company as director of research. Harold Mazza, research process engineer for company, becomes assistant director of research.

Eston Chemicals division of company at Los Angeles names George S. Wheaton vice president and Thomas F. Edson vice president in charge of special engineering projects. Richard J. Hefler assumes post of assistant to president, retaining duties as secretary. Joseph Adinoff joins division as chief engineer, coming from Parke Davis & Co., Detroit.

United States Plywood Corp.

New vice president in charge of company's manufacturing operations in California, Oregon, and Washington is Gene C. Brewer. He has been in charge of company's Shasta plants since 1950.

Guardian Paper Co.

Floyd L. Carley, former San Francisco district sales manager of St. Regis Paper Co., is elected vice president and treasurer of this Oakland firm.

Convoir

George A. Covington is appointed assistant to manager of this firm's operation in San Diego. Roy H. Gilliland becomes manager of quality control. A. W. Morgan is new assistant manager—operations.



A. W. Morgan
Convoir



Wm. Clausen
General Metals Corp.

General Metals Corp.

William Clausen is appointed executive vice president of this San Francisco firm and general manager of its Enterprise Engine and Machinery division. Mr. Clausen was formerly vice president and general manager of Sangamo Electric Co., Ltd. of Canada, Toronto.

Long Bell Lumber Co.

J. M. White, assistant general manager of company's Weed division, moves to Vaughn, Ore., to assume an executive post. He is succeeded by Henry G. Reents, who is replaced as superintendent of plywood plant by John H. Dohrn, former assistant superintendent. Mr. Dohrn is succeeded by John McKown.

General Paint Corp.

Winthrop G. Henderson is named assistant to president of this San Francisco company.

Wauha Engineering Co.

John M. Muhleman is appointed chief engineer of this Sherman Oaks firm.

Texas Co.

Newly-assigned director of research at this firm's Montebello research laboratory is duBois Eastman. C. E. Emmons is named Los Angeles regional manager—technical services.

Kaiser Aluminum and Chemical Corp.

Paul Zeigler, director of company's department of metallurgical research at Spokane, moves to headquarters at Oakland. As a result of Mr. Zeigler's move, Dr. D. W. Smith, associate director of department at Spokane, assumes duties of laboratory manager in addition to his present post, and S. E. Maddigan, head of mechanical evaluation section at Spokane, becomes director of metallurgical department.

Kaiser Steel Corp.

George B. McMeans, vice president in charge of operations, moves his offices from company's Fontana plant to executive offices in Oakland.



G. B. McMeans
Kaiser Steel Corp.



N. A. Lamberti
Lear, Inc.

Lear, Inc.

J. Nelson Kelly joins this Santa Monica firm as divisional general manager of aircraft service division. N. A. Lamberti, former manufacturing executive of McCulloch Motors, joins company as staff assistant to the vice president and general manager of Lear Cal Division.

Hughes Aircraft Co.

Lawrence A. Hyland, former engineering vice president of Bendix Aviation Corp., is named vice president and general manager of this Los Angeles aircraft company.

U. S. Spring & Bumper Co.

This division of Rheem Manufacturing Co. at Los Angeles elects as president W. S. Rheem II, general manager of Rheem, and as vice president and general manager Frank G. Fisher, former vice president and general manager of Houdaille-Hershey Corp.

Byron Jackson Co.

Ross Barrett, former vice president of Foreman & Clark, joins this Los Angeles firm to direct public relations, advertising and sales promotion programs.

Shell Oil Co.

Davis W. Reed, mechanical engineer, Ventura division, is promoted to mechanical engineer, Los Angeles area. Promotions of junior mechanical engineers in Los Angeles are: Burton C. Carlson, now mechanical engineer, Long Beach; Jay R. Geddes, now mechanical engineer, Ventura; Larry C. Kempton, now mechanical engineer, Bakersfield.

Production Management Engineering Assocs.

E. D. Hayward, who has been with this San Francisco firm since 1926, is elected president, succeeding Charles W. English, who is retiring from fully active duties.



E. D. Hayward
Prod. Management
Eng. Assocs.

R. E. Durland
Calaveras
Cement Co.

Calaveras Cement Co.

This firm appoints R. E. Durland assistant plant chemist at San Andreas. Mr. Durland comes to new post from Southwest Potash Corp. in Carlsbad, N. M.

Standard Oil Co. of Calif.

S. Z. Natcher, assistant to vice president of conservation, Los Angeles, is transferred to London as resident executive. Robert W. Johnson, former secretary-treasurer of Salt Lake Refining Co. and Salt Lake Pipe Line Co., becomes assistant comptroller of Standard Oil's western division in San Francisco.

Southern Pacific Co.

Merle L. Jennings, superintendent of company's Sacramento division, retires after 48 years of service. He is succeeded by Robert A. Miller, who is replaced as assistant superintendent of that division by Samuel B. Burton.

University of California

Arthur M. Ross, professor of industrial relations, is appointed director of Institute of Industrial Relations, northern division.

Crafton Orange Growers Assoc.

Howard C. Ranney is new manager of Assoc.'s packing house in Mentone, succeeding Gordon Cram, resigned.

Preco, Inc.

Herbert J. Wieden, former president of this Los Angeles firm, is retained as consultant by Union Asbestos & Rubber Co., Chicago.

COLORADO

Colorado Fuel and Iron Corp.

New manager of mines for this company is Robert R. Williams, Jr., former assistant manager of mines at Pueblo. He succeeds George H. Rupp, deceased. Eugene S. Doyle becomes assistant superintendent of industrial engineering for company's Pueblo plant, transferring from Buffalo plant.

Great Western Sugar Co.

Five managers of this company are transferred in West: Albert M. Watson from manager at Windsor, Colo., to manager at Fort Morgan and Brush, replacing J. L. Williams, retired; W. C. McCarty, from manager at Lovell, Wyo., to manager at Windsor; Charles A. Johnson from assistant manager at Denver to manager at Lovell; LaMar Henry from assistant manager at Scottsbluff and Gering, Neb., to assistant manager at Denver; and Irwin L. Johnson from Great Falls, Mont., to assistant manager at Billings, replacing Charles S. Mann, deceased.



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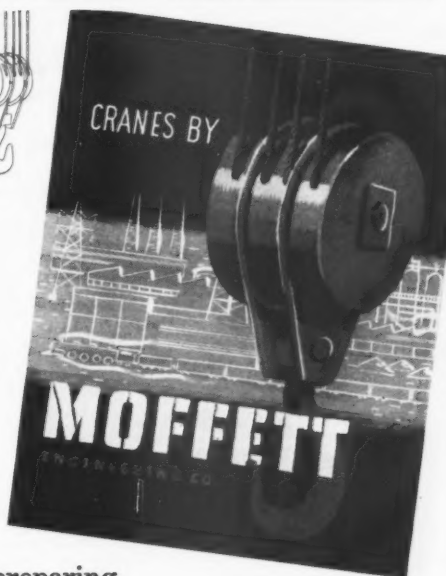
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WESTERNERS AT WORK

Dulaney Mining Co.

Frank H. MacPherson is appointed general manager of this Grand Junction company. Mr. MacPherson was formerly director of production division, Grand Junction operations office of Atomic Energy Commission.

National Bureau of Standards

New division chiefs for four scientific divisions of Bureau's Boulder laboratories are: Russell B. Scott, cryogenic engineering; Dr. Ralph J. Slutz, radio propagation physics; Kenneth A. Norton, radio propagation engineering; and Dr. Harold A. Thomas, radio standards. Dr. Harold Lyons becomes assistant chief for research, radio standards division, and chief of microwave standards branch.

Colorado Fuel and Iron Corp.

Anthony E. Pagnotta is named general foreman of company's Allen mine, succeeding Leonard C. Ford, deceased. Frederick Gugli is new foreman at mine's west portal.

MONTANA

Victor Chemical Works

Roy E. Paul, supervisor of Montana activities of this company, transfers to company's plant at Tarpon Springs, Fla. LaVern O. Streitmater, former production assistant to Mr. Paul, becomes superintendent of Silver Bow, Montana, plant, and Clarence G. Derick, Jr., former supervisor of construction and operation of Silver Bow plant, is promoted to project engineer of phosphate rock mining operations with headquarters in Butte.

NEVADA



W. J. Akert
Kennecott Copper
Corp.

Kennecott Copper Corp.

Walter J. Akert, chief metallurgical engineer at company's Chino, N. M., division, is named concentrator superintendent of Nevada mines division at McGill. He succeeds L. G. Immonen, now with Henderson, Nev., chemicals firm.

UTAH

Western Rock Bit Manufacturing Co.

Charles A. Mueller is named chief engineer of this Salt Lake City firm. Mr. Mueller formerly held post of assistant director of research at Lindberg Engineering Co., Chicago.

National Lead Co.

Brower Dellinger is named area exploration engineer for firm at Moab. He was formerly manager of exploration.

ASSOCIATIONS ELECT

Talca Management Club,
(National Assoc. of Foremen):
President, L. G. Brenner.

American Institute of Steel Construction:
President, Earle V. Grover, Apex Steel Corp., Ltd., Los Angeles.

Quartermaster Assoc.:
National vice president, Col. F. Mencacci, commanding officer, 311th Logistical Command, Los Angeles.

American Assoc. of Oil Well Drilling Contractors:
California chapter chairman, Stanwood I. Williams, Thomas P. Pike Drilling Co.

Pacific Coast Gas Assoc.:
Chairman of manufacturers section, John F. Ray, General Controls Co.

California Manufacturers Assoc.:
President, R. J. Miedel, president, United Can and Glass Co., Hayward; vice president, Rodney S. Durkee, board chairman, Lane-Wells Co., Los Angeles; secretary, C. E. Schink, vice president and treasurer, C & H Sugar Refining Corp., San Francisco; treasurer, J. H. Pengilly, vice president, Square D Corp., Los Angeles.

American Welding Society:
Second vice president, Clarence P. Sander, Consolidated Western Steel Division of U. S. Steel Corp., Vernon.

Instrument Society of America:
Vice president, A. A. Anderson, Swissmatic Products, Los Angeles.

New Mexico Mining Assoc.:
President, A. J. Thompson, New Mexico Institute of Mining and Technology; first vice president, J. B. Knaebel, Phelps-Dodge; second vice president, J. T. Lewis, Jr., U. S. Smelting, Refining and Mining Co.



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WORM • HELICAL
STRAIGHT & SPIRAL BEVEL
RACKS • SPROCKETS**

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TRADE WINDS

Three new district managers

Benjamin Electric Manufacturing Co. of Des Plaines, Ill., sets up new district offices at Los Angeles, Seattle and San Francisco, headed by new division manager, Oliver C. Westberg. Mr. Westberg, who has been with company for 31 years, was formerly Benjamin's sales representative in St. Louis, Mo. He succeeds Carl O. Martin, who is retiring from post after 41 years of service for Benjamin but will continue as a special representative. Pacific Coast Division has been divided into three districts: Southern, with headquarters in Los Angeles, directed by G. A. Hochenauer; Central, at San Francisco, under district manager John Keyes; and Northern, at Seattle, headed by Henry Huber.

Returns to Trade-Wind

W. F. Warren is appointed purchasing agent of Trade-Wind Motorfans, Inc., Rivera, Calif., manufacturers of ventilating equipment. He has been business manager of Bennett Motor Co. of Salt Lake City, but was previously with Trade-Wind until 1948.

Solar bulletins

Solar Steel Corp. of California, Los Angeles, appoints Walter Kilimnik its sales manager in charge of sales and customer service in California. He was previously associated with U. S. Steel Supply Corp. in Chicago and Los Angeles. R. R. Lawson is Solar's new manager of tubular products, in charge of planning and directing an over-all sales and service program on tubular products.

New facilities are installed by Solar Steel at Los Angeles, making possible a complete torch cutting and Blanchard grinding department under one roof. Flame burning, plate leveling, and grinding, plus normalizing and annealing, are now offered in one-stop service.

New line for Woodbury

Woodbury & Co., Portland industrial supply house, is appointed distributor for New York Belting and Packing Co. of Passaic, N. J., handling complete line of belting, hose, timing belt drives, packings, and other industrial rubber products.

Ostrander heads Enterprise sales

Arthur W. Ostrander is appointed general sales manager of Enterprise Engine and Machinery Division, General Metals Corp., San Francisco producer of heavy-duty engines. He was formerly executive vice president of American Farm Machinery Co. of Minneapolis, Minn. In his new post he will supervise Enterprise program for introducing new engine models of over 5,000 hp. and expanding sales and service personnel.

Ziegler joins ASWA

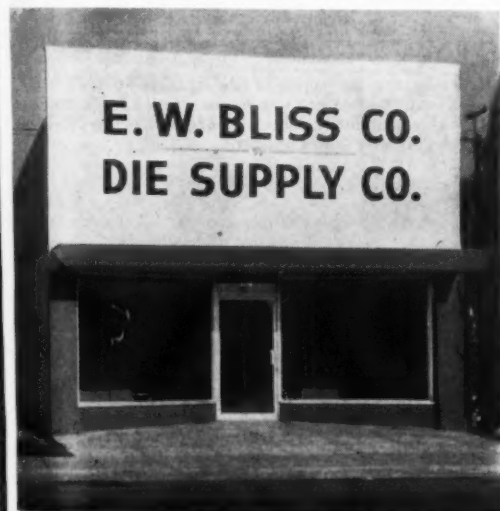
Ziegler Steel Service Corp., steel distributor operating plants in Los Angeles and Oakland, is elected to membership in American Steel Warehouse Assoc., Northern and Southern California chapters.

Stock pumps on West Coast

Carver Pump Co., with factory at Muscatine, Iowa, opens warehouse in Long Beach to supply Western markets with its complete line of contractors pumps, irrigation pumps, and general service industrial pumps.

New Denver representative

Magline Inc. of Pinconning, Mich., appoints Plant Equipment Co., Denver, to sell and service its materials handling equipment.



New Burbank sales quarters of E. W. Bliss Co.

New look of Bliss

E. W. Bliss Co., press manufacturers, sets up direct representation in California coincident with establishing stocks of standard replacement parts at company's new West Coast plant at San Jose. M. Frank Strauss and Don Walker, who have represented Bliss in California in their previous connection, have joined the Bliss organization, and Jack V. Harris, sales engineer, has been added to cover San Francisco and the Bay Area. Star Machinery Co., Seattle, will continue to represent Bliss in the Pacific Northwest. The Southern California sales and service will be at 816 N. Hollywood Way, Burbank, and Northern California at the factory, 7th and Commercial St., San Jose.



M. F. Strauss



Don Walker



J. V. Harris

SULPHURIC ACID
for the west
66° BAUME 20% OLEUM
98%
and special grades

Garfield

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SALT LAKE CITY, UTAH

**CHEMICAL
& MFG. CORP.**



**Industrial
and
Protective
Coatings**

that wear better!

Especially formulated to protect metal, wood, concrete—submerged or not; acid and alkali resistant. Colors available. Full free details, write for: Folder 575, Dept. 8.



INERTOL CO., Inc.

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ANSWERS TO YOUR PUMP PROBLEMS

These **New TUTHILL Catalogs**
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Pumps for

**LUBRICATION,
HYDRAULIC,
COOLANT,
TRANSFER and
BURNING OILS
Service.**



CATALOG 101—(Model L Series) Mechanically-sealed pumps in capacities from 1/4 to 6 g.p.m. and pressures to 600 p.s.i.



CATALOG 102—(Model C Series) General purpose pumps in capacities from 2 to 200 g.p.m. and pressures to 100 p.s.i.



CATALOG 103—(Model CK Series) High pressure pumps in capacities from 5 to 200 g.p.m. and pressures to 400 p.s.i.



CATALOG 104—(Model M Series) Coolant pumps with automatic internal by-pass. Capacities from 2 to 50 g.p.m. and pressures to 15 p.s.i.



CATALOG 105—(Model R Series) Automatic reversing pumps in capacities from 1/4 to 200 g.p.m. and pressures to 100 p.s.i.



CATALOG 106—(Types S and SA) Stripped pumps for built-in applications. Capacities from 1/4 to 200 g.p.m. and pressures to 100 p.s.i.



CATALOG 107—(Type SU) Multiple V-belt pumping units in capacities from 2 to 50 g.p.m. and pressures to 300 p.s.i.

Tuthill pumps are of the rotary, internal-gear, positive displacement type.

Any one or more of these Tuthill catalogs are available on request. They include individual pump guides to help you select the Tuthill pump best-suited to your requirements. Please ask for catalogs by number.



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Dependable Rotary Pumps since 1927
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Westco Pump Sales Company, 85 Industrial Street
San Francisco 24, California, Valencia 6-5104
Wagner Hydraulic Company, 10633 Wellworth Avenue
Los Angeles 24, Calif., Arizona 8-5332 and Bradshaw 2-2091

TRADE WINDS

New All-State man in Northwest

Harry G. Peacor of Portland is appointed regional manager for All-State Welding Alloys Co., Inc., to cover states of Oregon, Washington, Idaho, Wyoming, and Montana, northern California, and western Canada. He will take charge of sales and service to customers and distributors and serve as contact man for company's metallurgical resources and experimental laboratory at White Plains, N. Y. He was last associated with Consolidated-Vultee Aircraft Co.

Reynolds grows in West

Reynolds Metals Co. is building a combination sales office and warehouse at Third and Marin Sts., San Francisco, for lease to Clingen and Fortier, distributor for Reynolds. Building, to have an all-aluminum exterior, will provide about 38,000 sq. ft. of warehouse area and 7,500 sq. ft. of office space on two floors.

Reynolds also appoints two new distributors in California. Aaron Ferer and Sons, Inc., will stock aluminum pig and ingot in standard and special analysis alloys for the Los Angeles area. Globe Metals Co. of Oakland will also stock and service primary aluminum pig and ingot.

New building for Timken

Los Angeles office of Timken Roller Bearing Co. moves to new quarters (below) at 2727 South Flower St., which provide a 7,000-sq. ft. office and warehouse area. L. J. Halderman is service sales branch manager; H. V. Fleming heads industrial and automotive divisions; and S. R. Kallenbaugh is steel and tube division sales manager.



Second-in-command

Frank T. Goll is appointed assistant sales manager of C. A. Norgren Co., Englewood, Colo., manufacturer of pneumatic products such as air line filters, pressure regulators, oil fog lubricators, and other compressed air controls. Mr. Goll has been head of Norgren order department and closely associated with home office sales activities for almost two years.



F. T. Goll
C. A. Norgren Co.



H. L. Waltman
Leschen Wire Rope
Div.

Transfers to Seattle

Herbert L. Waltman is named manager of Pacific Northwest district for Leschen Wire Rope Division, H. K. Porter Co., Inc., with headquarters in Seattle. He moves from similar post at Denver.

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METAL**

COMPTON FOUNDRY

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Phones: NE 6-2171 or NE 2-3392



Link-Belt opening in Portland

New district sales office and warehouse in Guilds Lake area of Portland is officially opened by Link-Belt Co. of Chicago, Ill. Company-owned building provides office space, warehouse facilities, and a factory branch store.

"Controlling" Phoenix and Seattle

Vinson-Carter Electric Co. of Phoenix is named a distributor for Allis-Chalmers control equipment in state of Arizona. Company is at present a distributor for A-C motors.

Caskey Engineering Co., Seattle, is another new distributor for Allis-Chalmers. Company, headed by T. C. Caskey, will handle A-C motors and control equipment in the 12 counties of western Washington.

Plastic pipe specialist

F. J. Young, Jr., is appointed plastic pipe specialist on sales force of Republic Supply Co. of California, Los Angeles. He started with company as a research engineer in 1946 and transferred to industrial sales department in 1948, where he has continued except for two years with U. S. Navy. Mr. Young in his new post will carry on work begun two years ago by Robert E. Deshon, now assistant manager, northern division.

Thom with Lewis-Shepard

Ray W. Thom is appointed sales and service representative for Lewis-Shepard materials handling equipment in Portland, with offices at 7427 N. Denver Ave.

New vice presidents for ESCO



J. J. Davis

R. S. deWeese

Electric Steel Foundry Co., Portland, appoints R. W. deWeese vice president in charge of sales and Jefferson J. Davis vice president in charge of product divisions. Mr. deWeese has been with ESCO for fourteen years, for a part of that time as manager of company's high alloys division and managing head of metallurgical and inspection departments. Mr. Davis joined ESCO in 1936 and since 1945 has held post of manager of construction equipment division.

Third expansion of Afton-Lemp

Afton-Lemp Co. of Boise, Idaho, moves to new 19,000-sq. ft. office and warehouse building, its third major expansion since the company was organized in 1941. Firm is a distributor of electrical supplies and appliances.

Air conditioners in Phoenix

Marvail, a division of Muncie Gear Works, Inc., of Muncie, Ind., plans to open a warehouse in Phoenix for distribution of air conditioning equipment throughout Arizona.

Shortages occur in the property accounts

- A check of the property accounts against the property itself frequently reveals substantial unrecorded deductions.

Such unexplained shortages may be prevented through Continuous American Appraisal Service which keeps the property record in line with the property facts.

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are \$7.50 a column inch. Copy should be sent in by
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24 HOUR SERVICE!
FREE DELIVERY ANYWHERE
MADE DIRECT FROM 50 8 x 10 13c ea.
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200 Tons of New Replacement Parts for
Clark—Towmotor—Hyster—Ross fork lift
trucks at **SUBSTANTIAL DISCOUNTS.**

THE ROMAN COMPANY
3316 E. Olympic Blvd.,
Los Angeles 23, Calif.

TRADE WINDS

Set up West Coast warehouses

National Vulcanized Fibre Co. of Wil-
mington, Del., begins delivery of its mate-
rials handling products from warehouses
recently added in Los Angeles and San Fran-
cisco to serve West Coast customers. George
W. Harmsen is Western manager for com-
pany, with offices in San Francisco. Other
sales offices are located in Los Angeles and
Seattle. Company manufactures trucks,
boxes, barrels, and other receptacles for
materials handling use.

Pitkin new chief of staff

Ward H. Pitkin, former assistant general
sales manager, advances to post of general
sales manager for Oliver United Filters Inc.,
with offices at company's headquarters in
Oakland. He has been with company since
1925.



W. H. Pitkin
Oliver United
Filters, Inc.

T. O. Carroll
Soulé Steel Co.

Portland district manager

T. O. Carroll is appointed district man-
ager in Portland office of Soulé Steel Co.
succeeding E. W. Hussy, deceased. Mr. Car-
roll has been a sales engineer at company's
San Francisco headquarters for past 8 years.
In his new position, he will be in charge of
production and sales of Soulé standard
buildings, steel and aluminum windows,
metal lath products, and other metal build-
ing products.

Direct insulation board sales

Dar Ahern, former manager of Western
regional office in San Francisco of Simpson
Logging Co., becomes Western sales man-
ager for insulating and hardboard products,
with headquarters at Shelton, Wash., in-
sulating board plant. Paul Close, technical
director, supervises industrial sales of in-
sulation products.

Agents for industrial fiberglas

J. P. Stevens & Co., Inc., appoints Kirby
Industries, with headquarters in Azusa,
Calif., its national sales agent for industrial
fiberglass fabrics. William R. Thomas, sales
manager, will handle service on the Stevens
line, together with Herbert R. Kirby, presi-
dent of firm. Both men were formerly as-
sociated with Owens-Corning Fiberglass
Corp. Kirby Industries has sales offices in
principal cities throughout the country.

Ryerson extends alloy plan

Seattle plant of Joseph T. Ryerson & Son,
Inc., steel distributor, puts into effect com-
pany's certified alloy steel plan which has
been in use for several years at other Ry-
erson plants. Program centers around pre-
testing all alloy steels and identifying them
with color marking and heat symbol.

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THE West ON ITS WAY

NEW PLANTS, EXPANSIONS, NEW INDUSTRIES, PRODUCTION CONTRACTS,
DEVELOPMENT PROJECTS, UTILIZATION OF RESOURCES

Western business stable in third quarter

Overall business activity in the eleven Western states showed very little tendency to move in either direction during the third quarter. Seasonal employment gains were registered in some lines as usual; however the trend was not strong enough to push non-farm jobs up to the record level of last year. Bright spots in the Western economy were Denver and the San Francisco Bay area, with the Los Angeles area showing the same strength that was demonstrated throughout the 1953-1954 downturn.

The end of the Pacific Northwest lumber strike, coupled with a strong market for wood products, an upsurge of retail trade, and the launching of a number of large-scale engineering construction projects, gave Washington and Oregon more cause for optimism than they have had in some months, according to the Prudential Insurance Co. of America's quarterly digest.

Lumber production in Washington and Oregon was seriously curtailed during July and August by the recent lumber and sawmill workers' strike, but with the end of the stoppage in September it returned to more normal levels. For the Douglas fir industry, the first nine months' production was 20% less than a year ago. Western pine production for the same comparative period was off 8%.

Western construction

Construction in the West continued to climb during October, maintaining the trend of recent months, and totaled well above the same month of a year ago, according to the monthly statistical survey of Western Building.

The total valuation of building permits issued during October by Western cities and counties represented an increase of 33.4% over a year ago.

Bay area industry still expanding rapidly

Industrial development in the San Francisco Bay region continues at a high rate, according to the San Francisco Chamber of Commerce's Industrial Department. Though slightly below a record year, the expansion is comparable to all years from 1946 through 1952.

Cumulative totals, January through August 1954, are as follows:

San Francisco	
10 new plants	\$ 3,293,000
48 expansions	11,080,899
58 projects	\$14,373,899

Bay Region	
99 new plants	\$51,301,900
249 expansions	35,730,613
348 projects	\$87,032,513

Northern California	
137 new plants	\$60,321,200
291 expansions	39,483,013
428 projects	\$99,804,213

Capital expenditures

During the current 10-year period, 1951 to 1960, investor-owned public utilities in California plan to spend at least \$2,880,684,570 to provide expanded gas, and electricity facilities to the state according to the NAM. The association's survey indicating large capital expenditures—a plan to provide additional sources of power and heat—was participated in by: Pacific Gas and Electric; Coast Counties Gas and Electric; California-Pacific Utilities; Southern California Gas; San Diego Gas and Electric; Southern California Edison; California Electric Power; Southern Gas Company of California; and California-Oregon Power.

Some \$2,181,308,709 will be spent for increased electricity facilities, and approximately \$699,375,861 on new or enlarged gas installations. These totals include investments already made in 1951-1953.

Steel consumption

Consumption of steel mill products in the seven Western states reached a record peace-time high of 6,079,000 net tons during 1953 but estimates indicate that total shipments for 1954 will be approximately 10% below that figure, according to Kaiser Steel Corp.'s annual steel consumer survey.

Receipts of steel mills during 1954 are expected to be approximately 5,400,000, or about the same as 1952. The survey reveals that Western steel warehouses supply 25% of the total steel receipts as compared with the national average of 18%. Western metalworking plants tend to be of smaller average size than the national average and therefore are more likely to rely on warehouse stocks than on mill orders. About 5% of the metalworking plants employing 500 or more are located in the seven Western states, while 17% of the shops employing three or less are also in this area.

Local mills supply 56% of steel received in the seven Western states; eastern mills supply about 42%; and imports from foreign countries provide the remaining 2%. Southern California was the largest consuming area in 1953 with 42% of the total.

Record building year in Northwest, maybe

There is a chance that 1954 may be the record building year in the Pacific Northwest's history, according to the Equitable Savings and Loan Association's statistical analysis at the end of October. At the end of 10 months, the combined building valuation in the area's 47 largest cities had surpassed the annual total of 1948, until now the second highest year. It has also eclipsed the annual figures of 1949, 1951, 1952, and 1953, and is within \$43,825,390 of 1950, the all-time high. The building year may well result in a final total close to the 1950 peak, which was \$334,001,668.

ALASKA

PUSH SHIP PLAN—New steamship company, Alaska Merchants Line, is organized by 300 Alaska businessmen, to build and operate ships between Puget Sound and southeastern Alaska. Philip F. Spaulding, Seattle naval architect, is retained to design a suitable vessel for this service.

ARIZONA

BUILDING BOXES—ABE Corrugated Box Co. is in full swing in Phoenix, manufacturing corrugated boxes.

TOOLS AND DIES—Arizona Tool Products Co., new Phoenix firm, will produce tools, dies, jigs, and fixtures.

GOLF CARTS—Elbex Manufacturing Co., Phoenix, begins manufacture of electric golf carts, employing 20 people.

FRANCIS PLATING—New Phoenix firm, Francis Plating Corp., will specialize in close-tolerance industrial chrome plating. Company plans to employ about 10 people in full operation.

MOVE TO PHOENIX—Hollar Tool Engineering Co. moves to Phoenix from Prescott. Company is doing subcontracting for several Phoenix firms.

NEW FENCES—Panelink Fence Co., organized this year in Phoenix as subsidiary of Smith Pipe and Steel, is producing new type of prefabricated fence panels, employing 12 people.

IN OPERATION—Walter T. Cole Co., another new Phoenix firm, is employing five men in carbide steel threading.

TO ADD THIRD KILN—Arizona Portland Cement Co. will install a third cement kiln, with 3,000-bbl. capacity, at its Rillito plant. Kiln, manufactured in New York, has already been received; construction of foundations begins this month; and equipment is scheduled to be in operation by next July, boosting total production to over 2,500,000 bbl. annually.

TELEVISION PLANT IN AN ORCHARD—Sylvania Electric Products Inc. of New York begins operations at its new Los Angeles plant, which has 51,000 sq. ft. area for manufacture of picture tubes. Builders were H. K. Ferguson Co.



PATENT PENDING—Stewart Manufacturing Co. of Phoenix is now producing about 20 all-metal cooling towers weekly, based on new design developed by firm for compact tower suitable for home or business use. Company, organized in 1946, initially produced only air conditioners.

CALIFORNIA

LOS ANGELES HARBOR PROGRAM

Four construction projects estimated to cost nearly \$3,000,000 will be undertaken by Los Angeles Harbor Department. They include a 600-ft. timber marginal wharf for fishing boats, a 300-ft. marginal concrete and steel wharf for shipping, widening of transit shed, and new steel and concrete transit shed.

BUY ASPHALT PLANT—Industrial Asphalt buys Monrovia plant from W. E. Hall Co., which will continue to operate as paving contracting firm. Industrial Asphalt, subsidiary of Atlas Investment Corp., now owns and operates ten asphalt plants in Southern California.

KAISER-AEC AGREE—Atomic Energy Commission authorizes independent study by Kaiser Engineers Division of Henry J. Kaiser Co., Oakland, under government's Industrial Participation Program. Study will cover engineering and economic aspects of nuclear reactors for generation of industrial power.

MORE SCHOOL SUPPLIES—Son-Nel Products Co. and its affiliates, contractors on school equipment for Northern California, move to expanded headquarters in Oakland. Company manufactures chalkboards, bulletin board, folding tables, and other school supplies.

REDWOOD BARK PLANT—Union Lumber Co. begins construction of bark-processing byproducts plant at Fort Bragg.

FOXBORO PLANT OPENS—New instrument service and assembly building opens in San Leandro for Foxboro Co. of Foxboro, Mass., manufacturer of industrial instruments.

STRIKE WATER—Lila King Mining Co. celebrates discovery of water near Randsburg in Kern County to supply its tungsten mining operations. Search was conducted by George C. Heikes, engineer and geologist, and MacAfee and Co. of Los Angeles, consulting mining engineers. Three wells, drilled by Old Naasau Exploration Co., now have capacity of 3,500,000 gal. per day. Company plans to convert operations from drag-line to dredge mining and to purchase \$1,000,000 dredge.

NEW SULPHUR PROCESS—Southwestern Engineering Co., Los Angeles, is awarded contract for construction and engineering of a series of sulphur refineries throughout the world for American Sulphur and Refining Co. and associates, who will use new process for producing elemental sulphur from low-grade surface ores. First plant, located in central Utah, is reported to be nearly completed. Process is one licensed to American Sulphur and Refining by Standard Oil Development.

FIRST OF ITS KIND—Stauffer Chemical Co., San Francisco, will build new plant at Vernon, adjacent to present fertilizer plant, for production of pelletized superphosphate and other fertilizers, using new process developed by company. Initial production is planned for mid-1955. Richmond plant will be expanded later. Program will cost over \$1,000,000.

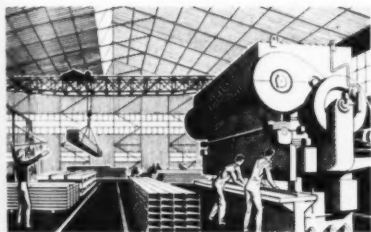
NEW LUMBER MILLS—Black Mountain Milling Co., Hornbrook, opens new mill with capacity of 35,000 bd. ft. per shift. Hornbrook Manufacturing Co. expands operations to two shifts with about 100,000 bd. ft. per shift. Willamette Builders Supply Co. puts its \$750,000 plywood plant at Happy Camp into full operation, shipping plywood by rail from Hornbrook.

PRODUCT SWITCH—Fruit Growers Supply Co., Westwood, completes installation of cravener machinery in what was formerly a plywood plant and begins production of orange flats and collars from new paper-and-veneer laminate.

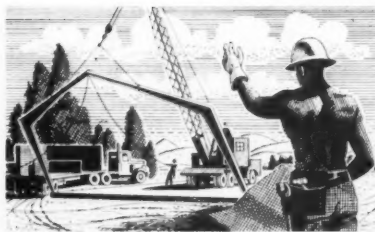
EXPANDED POMONA TILE—Pomona Tile adds about 51,000 sq. ft. to its plant at Pomona, Calif., and increases its staff by over 100 persons. Expansion, completed at cost of \$500,000, is expected to increase production by almost 40%.



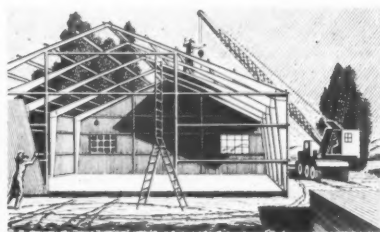
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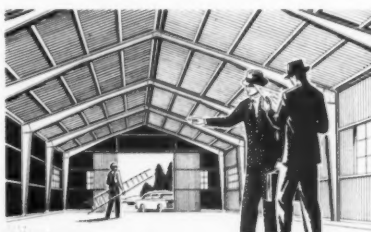
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TWICE AS BIG—Southern California Poultry Co. completes \$300,000 expansion of its poultry processing plant in Los Angeles and now has doubled capacity. Plant can process 18,000 chickens and 5,000 turkeys per day.

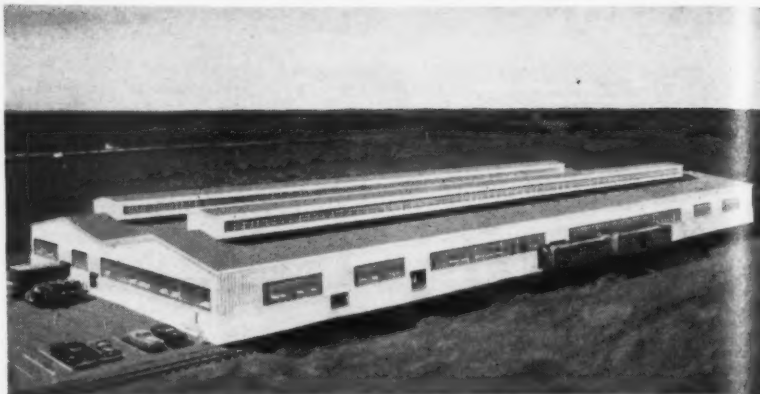
RIVERSIDE ACTS—City of Riverside annexes industrial site of 44.83 acres on which Hunter Engineering Co. is building plant for advanced industrial research in metallurgy, electronics, plastics, and related fields. City will supply police and fire protection, sewer and water facilities, street maintenance, and other services.

MOVING TO SAN DIEGO—Reflin Co., manufacturer of plastic pipe, plans to move from Gardena to Kearny Mesa industrial area of San Diego.

ORDNANCE CONTRACTS—Army-Ordnance contracts are awarded to the following firms: Rheem Manufacturing Co., San Pablo, supplemental contract for production of 81 mm. mortar shells, \$1,457,640; Chemurgic Corp., Turlock, production of smoke signals, \$868,000; Pacific Tire and Rubber Co., Oakland, tires for Army vehicles, \$633,750.

AIR FORCE CONTRACTS—U. S. Air Force places orders for aircraft with West Coast firms, among them contracts for production of F-104 light-weight fighter and RC-121 radar plant (also being produced for U. S. Navy), to be built at Burbank plant of Lockheed Aircraft Co.; and contracts covering B-52 jet heavy bomber and KC-135 jet tanker transport, to Boeing Airplane Co. of Seattle. Boeing awards subcontracts to Ryan Aeronautical Co. and Rohr Aircraft Corp. for components and assemblies used in KC-135.

NEW SANTA ANA PLANT—Electronic Engineering Co. of California and EECO Production Co., its subsidiary, will build new laboratory and plant on seven-acre site recently acquired in Santa Ana. Company divisions now at several locations in Los Angeles will be centralized at new Santa Ana plant.



PREVIEW—Architect's perspective of new aluminum rod-rolling mill to be completed early next year for Anaconda Wire and Cable Co. at Great Falls, Mont.

EXPAND LAB FACILITIES—Wyle Laboratories, El Segundo, installs new facility for testing jet aircraft components. Associated firm, Wyle Research Corp., has developed new electromagnetic vibrator for vibration analyses of electronic devices for military and commercial use.

NUT CORP.—Nut Corp. of America is organized in Los Angeles for manufacture of brass and steel machine screw nuts by powdered metallurgy process.

RENAMED—Technical Industries, Inc., of Los Angeles, adopts new name of Air-quipment Co., reflecting manufacture of new aircraft products. Company has developed miniature and sub-miniature permanent magnet motors with gear reduction units providing 1,600 to 1 reduction, weighing only 5 oz.

CAL RESEARCH GROWS—California Research Corp. begins construction of new facilities at Richmond, to cost over \$1,500,000 and to include a new engine laboratory and new wing on main building. H. K. Ferguson Co. is awarded contract to build engine laboratory.

NEW MILLS FOR C-Z—Crown Zellerbach Corp., San Francisco, completes engineering plans for two new mills which will be in operation by mid-summer 1956. Proposed kraft paper mill will be built on 42-acre site along San Joaquin River at Antioch, Calif., and equipped with 252-in. wide paper machine to be built by Beloit Iron Works, Beloit, Wis. Antioch mill will be supplied with unbleached kraft pulp from projected pulp mill on Duncan Bay, Vancouver Island, B.C., to be built alongside present C-Z newspaper mill at Elk Falls.

PICKLING STEEL—Pacific Tube Co. of Los Angeles begins construction of new facilities which will double its stainless steel tube pickling capacity. Expansion, to cost about \$200,000, is being built by T-S Construction Co. for completion by February.

BUY SUNRAY REFINERY—Union Oil Co. of California acquires Santa Maria refinery of Sunray Oil Corp. and buys that company's crude oil production in adjacent area to supply Union plant now being built at Santa Maria. Newly acquired refinery, which produces asphalt and products at 5,000 bbl. per day capacity, will be operated by Union on regular schedule. Sunray, which has its main refinery in Oklahoma, will concentrate California operations on exploration and production.

OKAY RAM JET—Civil Aeronautics Administration in Washington certifies Hiller ram jet engine designed and built by Hiller Helicopters, Palo Alto. First of its type to be approved, engine is designed for tip mounting on helicopter rotor blades.

TESTING FATIGUE—Krouse Western Laboratories, Inc., of Van Nuys, opens new laboratory specializing in fatigue testing of materials. Company is a Western offshoot of Krouse Testing Machine, Inc., Columbus, Ohio.

NEW FREIGHT SERVICE—New 56-hour freight service between Los Angeles and Seattle is begun by Great Northern, Western Pacific, and Santa Fe railroads on a three-trips-per-week basis.

KUHLMAN BUYS—Kuhlman Electric Co. of Bay City, Mich., acquires State Metal Fabricators, Inc., Salinas, to be operated as a Western Division branch plant.

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CLIMAX ADDS—Atomic Energy Commission signs contract with Climax Uranium Co. for construction of expanded facilities at uranium ore processing plant operated by Climax at Grand Junction. Addition is expected to be completed in about nine months.

CARTON PLANT—Fibreboard Products Inc., San Francisco, buys 14-acre site in Denver from Santa Fe Railway and begins construction of new 30,000 sq. ft. carton plant. Plant will be headed by L. M. Brantley, now at company's San Joaquin division, and will initially employ about 50 persons in manufacture of milk cartons.

MICRO SWITCH CENTER—Micro Switch, division of Minneapolis-Honeywell Regulator Co., opens new research and product development center in Denver. New facility, which supplements company research conducted at main factory in Freeport, Ill., will work on product development of precision snap-acting switches.

PRELIMINARIES—Tentative agreement for \$9,000,000 power generating and transmission plant in San Juan Basin, Colorado, is reached by Colorado-Ute group of rural electric cooperatives and Western Colorado Power Co., subsidiary of Utah Power and Light Co. Plan requires approval and loan by Rural Electrification Administration.

TELLURIDE DEVELOPMENT—Idaho Mining Co., subsidiary of Newmont Mining Co., plans construction of \$1,500,000 concentrator at Telluride, to be in full operation by late 1955. Concentrates will be sold to American Smelting and Refining Co.

IDAHO

TEN-YEAR PLAN—Idaho Power Co., Boise, at annual stockholders meeting puts forward ten-year construction budget of \$261,000,000. Company now has applications before Federal Power Commission for licenses to build three dams in Hells Canyon section of Snake River.

AUTO SAFETY BELTS—Rodman and Wallace Manufacturing Co. of Boise is manufacturing safety belts for automobile passengers, in addition to its chrome plating operations.

DEVELOP NEW INSTRUMENT—U. S. Bureau of Reclamation constructs vane borer for in-place determination of shear of soils, modeled after one developed by University of Idaho in cooperation with State Department of Highways. Bureau of Reclamation is reported to be using new device in soil strength tests on a Utah project.

BUILDING FOR AEC—Arrington Construction Co. of Idaho Falls is awarded \$79,940 contract on construction of gamma irradiation facility building at National Reactor Testing Station, Idaho Falls.

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MONSANTO ADDS FURNACE—New electric furnace costing several million dollars is put to work at Monsanto Chemical Co.'s Soda Springs phosphate plant, doubling production of elemental phosphorus.

IN FULL SWING—Idaho Chemical Industries, Boise, which was established several months ago, is at present manufacturing plastic corrugated sheeting for roofing and plans to expand into other fields, including agricultural and sanitary chemical products.

NEVADA

LAND FOR INDUSTRY—Reno City Council annexes a former ranch property, which will be subdivided for industrial use.

NEW MEXICO

DISCUSSIONS—National Farmers Union of Denver and Kerr-McGee Oil Industries, Inc., Okla., are reported to be considering formation of a joint venture to construct a potash plant near Artesia, N. M., and then distribute and market potash for use in commercial fertilizers.

OREGON

SUPERPHOSPHATES—Hughes-Johnson Chemical Co. remodels former shipyard property in Portland for production of superphosphates, with planned output of 20,000 tons per year. Plant will supply Meeker-Hughes Co., Salem fertilizer producer, which is an affiliate.

UNDER CONSTRUCTION—Oregon Saw Chain is building new 68,000-sq. ft. plant in Portland.

PRODUCTION LINE MOVES—Kaiser Gypsum Co. begins operations at its gypsum plaster and wallboard plant at Seattle, employing about 170 persons. Located near Duwamish Waterway, plant will receive most of its raw gypsum rock by company ore vessel. Plant was constructed by J. C. Boespflug Construction Co. of Seattle and designed by Kaiser.



SNAKE RIVER PLANS—Pacific Northwest Power Co. applies to Federal Power Commission for preliminary permit to work on plans for 850,000-kw. hydroelectric development on Snake River in Oregon and Washington. Company proposes two dams—at Mountain Sheep and Pleasant Valley—with total cost estimated at over \$200,000,000. Pacific Northwest is owned by Pacific Power and Light Co. and Portland General Electric Co. of Portland; Washington Water Power Co., Spokane; and Montana Power Co., Butte.

BUY EQUIPMENT—Consolidated Freightways, Portland, places order totaling \$3,319,000 for new vehicles. This is in addition to orders earlier this year amounting to about \$3,000,000. Deliveries on new orders will be three fourths completed by January, and remaining vehicles will be in service by June 1955. Equipment is being built by Fruehauf, Brown, Trailmobile, and Peerless.

BUY VENEER PLANT—Corvallis Plywood negotiates purchase of Peak Plywood Corp. veneer plant located between Corvallis and Philomath. Name of newly acquired company will be changed to Mary's Peak Veneer Co.

GOVERNMENT PLANT SOLD—General Services Administration accepts \$227,000 bid of Learner Investment Co., San Francisco, for government-owned alcohol plant at Springfield, Ore. Built in 1942, plant was used for short time for experimental production of ethyl alcohol from waste woods and was then leased to Oregon Wood Chemical Corp., whose lease expired in 1952.

PLYWOOD ACQUISITION—U. S. Plywood Corp. acquires through a planned exchange of stock the assets of Associated Plywood Mills, Inc., covering two plywood plants in Oregon, seven plywood distributing warehouses, sawmill, and large timber holdings.

FOUNDRIY GROWS—Precision Castparts Corp., Portland, is building new one-story plant which will permit expansion of operations. Company recently added complete shell molding facilities to its Portland plant, which also is equipped for investment casting processes. Other departments of firm are engineering, tool and die shop, inspection and finishing, and metallurgical laboratory.

HARDBOARD PLANT—Chapman-Woods, Inc., new Oregon company, plans to build \$400,000 plant near Philomath for manufacture of pressed wood panels from sawmill and paper mill waste. Plant, which will produce 50 tons in three shifts, will use new process and equipment developed by Ralph Chapman, one of its incorporators.

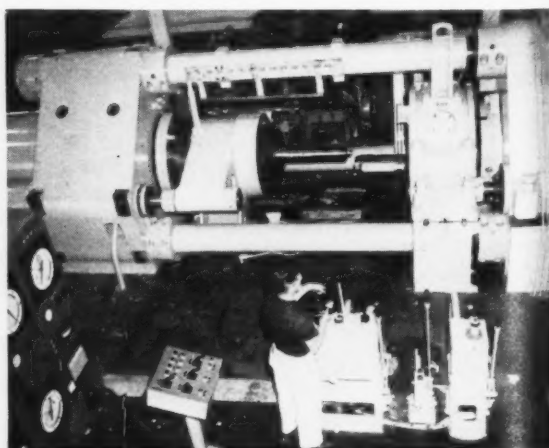
UTAH

U. S. STEEL BUILDS—Construction work is under way on steel pipe manufacturing plant for Consolidated Western Steel Division of U. S. Steel Corp. near Geneva Works of Columbia-Geneva Steel Division, Provo. Company has acquired 117 acres for plant site. New mill will produce electric weld pipe used for transmitting natural gas, petroleum products, and water, employing over 200 men. It is expected to be in operation by next spring, and will replace line pipe manufacturing facilities of Consolidated Western plants at South San Francisco, Berkeley, and Los Angeles.

U. S. Steel also plans to build a \$20,000,000 anhydrous ammonia plant at its Geneva works early in 1955, to be in operation in 1956. Blaw Knox Co.'s Chemical Plants Division will handle engineering and construction for new plant, which will have a production capacity of 70,000 tons of ammonia annually.

Columbia-Geneva Steel Division completes new gas precipitation unit at sinter plant of Geneva works.

ALUMINUM EXTRUSION—Aluminum Co. of America inaugurates new extrusion facilities at its Vancouver plant, part of a \$6,700,000 fabricating expansion program. Here an extrusion press receives heated aluminum ingot. New plant has two 2,500-ton hydraulic presses, as well as processing and finishing equipment.



TO BOOST CAPACITY—Western Phosphates, Inc., Garfield, plans to double capacity of its phosphoric acid production department, in \$250,000 to \$500,000 expansion program at its phosphate plant. Company is a joint affiliate of Stauffer Chemical Co. and Garfield Chemical and Manufacturing Co.

WASHINGTON

CHEMICAL ENTERPRISES—Chemical Enterprises, Inc., of New York, which recently purchased nine ammonia distributing companies from William C. McCall of Portland, will set up its Northwest headquarters in Walla Walla. Firm will continue to design and assemble field applicators at Walla Walla plant.

PROGRESS REPORT—Shell Oil Co.'s \$75,000,000 refinery now under construction at Anacortes is scheduled to be completed in late 1955. Over half of 800-acre tract of land was cleared of timber to permit construction of storage tanks, administration building, boiler plant, piping, and structures still under way. State of Washington in general election approves measure amending state constitution to permit corporations owned by alien stockholders to own land in state.



WAX REFINERY AT WOODS CROSS—Sure-Seal Corp. opens new \$3,500,000 wax refinery near Salt Lake City, which will produce 35 different types of waxes for industrial and commercial use, processing up to 700 bbl. of crude oil per day. By-products in this case are kerosene, jet fuel, solvents, and light oils.

WYOMING

NEW PIPELINE PROPOSAL—Cheyenne Valley Pipeline Co. submits new application to Wyoming Public Service Commission, proposing line from Cheyenne River area in Weston County via Lance Creek to Ft. Laramie, to connect with Service Pipeline Co. line. Ten-inch line would be extended to connect with Platte Pipeline Co. Estimated cost of project is \$2,844,116.

NEW IN NEWCASTLE—Assembly plant for steel buildings used in oil fields will be erected in Newcastle by Crown Manufacturing Co. of Chase, Kan. Plant will later be expanded with additional buildings, employing over 70 men.

OIL FIRMS MERGE—Husky Oil Co. of Cody acquires H. Earl Clack Co. of Havre, Mont., in exchange of stock. Purchased firm, a wholesale and retail oil distributor, will change name to H. Earl Clack, Inc.

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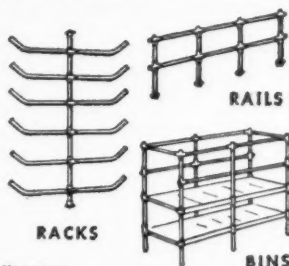
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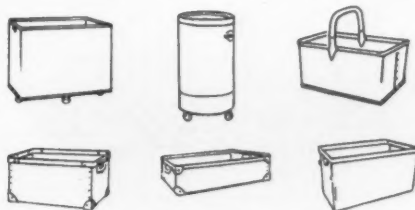
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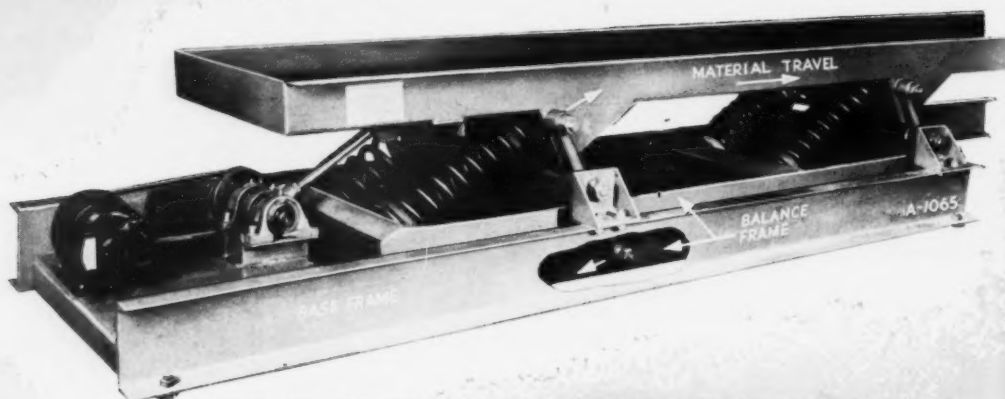
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NO SPILLAGE

There is no violent agitation to cause spillage. The trough is free of obstruction to flow, or pockets to trap perishable materials for spoilage or infestation. All conveyor surfaces can be easily cleaned and sterilized. Furnished with standard open troughs, but enclosed or special troughs for scalping or dedusting can be furnished.

Get complete information on the Natural Frequency Vibrating Conveyor. Ask to have an S-A engineer call, or write for Bulletin No. 353 which contains specifications and general information on dimensions, etc.



STEPHENS-ADAMSON MFG. CO.

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